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## The Earliest Buddhist Shrines

by STUART PIGGOTT

**A**MONG the earliest monuments of the Buddhist faith as propagated through India by king Asoka in the third century B.C. is a peculiar class of structure known as a stupa, and since Fergusson (1)\* first put forward the idea at the end of the last century it has been vaguely realized that these monuments were in all probability a formalized version of nothing more or less than a specialized type of prehistoric (and pre-Buddhist) round cairn. The possible implications of this prototype's peculiar features in reference not only in oriental, but in European archaeology, were pointed out by Mr Harold Peake with characteristic acumen (2), but no convenient summary of the relevant Indian material has appeared in an English archaeological journal, and a recent discovery in Jaipur State has thrown most interesting light on the subject at large. It seems therefore desirable to bring the results of the Bairat excavations before a wider archaeological public than that reached by the original report by the excavator, the late Rai Bahadur D. R. Sahni, and to consider it in relation to the wider question of the origins of the stupa and of the curious features which are presented in formalized guise on the elaborate monuments which represent the supreme artistic achievements of the Sunga Dynasty in the closing centuries of the pre-Christian era. I am deeply indebted to Mr Peake not only for material amplifying his original thesis, but for stimulating discussion and correspondence on the whole question. The latter part of this paper is in fact to such a degree based on his ideas that it amounts to an appendix in which I have paraphrased views expressed by him and shared by myself.

But before proceeding to describe the Bairat site, a brief preface on the stupa as an object of Buddhist veneration is necessary. Essentially it was in its earliest form a solid brickwork or stone structure, circular in plan and normally more or less hemispherical in section, in which originally was enclosed some tiny fragment of the body or personal possessions of Gautama Buddha himself, or of one of his disciples. It seems that Asoka was himself responsible for the institution of stupa-worship (3), or rather the adoration of, and the ritual connected with, the relic the stupa enshrined, but that his innovation went no further than the assimilation into the Buddhistic tradition of an already existing type of sacred structure; the round barrow or cairn that in earlier times had covered, not the much-divided precious relics of the Enlightened One, but the mortal remains of worldly chieftain or hero. This argument is, it must be admitted, at present unsupported by direct archaeological evidence of such earlier tombs—the possibilities

\* For authorities cited, see p. 10.

of discovering these are discussed later—but the sudden appearance of the stupa and its ritual trappings can hardly be regarded as an entire innovation by Asoka. The taking over by a new religion of the sacred sites or objects of that which it supplants, adapted to the new creed, is an anthropological commonplace, and it is worth while noting in passing that the custom of 'fractional burial' due to exposure before burial to birds and beasts of prey, dates back in western India to the third millennium B.C., and that to such an origin may perhaps be traced not only burial customs of late Sassanian times in Iran, recently discussed by Sir Aurel Stein (4), but also the ritual dividing up of the somatic relics of the Buddha. And that such prehistoric barrows as we have suggested were not merely shapeless mounds is implied by the remarkable series of ritual adjuncts with which we find the stupas provided in a stylized form at the earliest stages of their development, clearly pointing to a not long distant memory of analogous features in the assumed prototypes.

With this short preamble, we may turn to the excavations at Bairat, some fifty miles from Jaipur and in the state of that name. Here the State Department of Archaeology and Historical Research, under its Director, the late D. R. Sahni, carried out excavations which were published as a monograph by the Department in 1937 (5). Remains of a Buddhist monastery, which the coin-evidence assigned to the middle of the first century A.D., were found, but of definitely earlier date were the shattered fragments of at least two of the famous 'Asoka Pillars' of polished sandstone on which the monarch recorded his edicts throughout the length and breadth of his kingdom. And to this date, about 250 B.C., it was found belonged the much destroyed remains of a brick stupa enclosed in a circular shrine or temple, which is the subject of our particular interest. This temple is published, with a plan and section on which FIG. 1 is based, in the excavation report quoted above, and is regarded as a monument of one constructional period. A careful examination of the evidence as presented in Mr Sahni's excellently objective report convinces me, however, that this assumption is too simple, and does not account for several features, which, taken in conjunction, all point to a radical reconstruction and modification of the temple having occurred during the period of its use. The account which follows therefore, while based of course on the excavator's report, differs at several points in the matter of the interpretation of the observed and recorded facts. Where I have thus differed I have tried to make it clear where my view diverges from the late Mr Sahni's, and where my own line of reasoning is taken up.

The site as excavated presented the following features. The main structure, damaged in part by the ill-considered trench digging of the last century, consisted essentially of a circular building represented by the lower courses of two concentric brick walls having diameters of 35 ft. and 21 ft. respectively. The outer wall was of normal and simple brickwork, but the inner presented a remarkable 'half-timber' construction in which the sockets of 26 octagonal wooden pillars alternated with solid brickwork panels. Both walls had doorways to the east, with sleeper-trenches and post-holes for double wooden doors. The temple had apparently been destroyed by fire, the timber elements remaining as charred fragments only. Within the central area, much mutilated by the earlier excavators, were fragmentary stumps of brickwork acutely recognized by the excavator as the remnants of a small stupa, to which would have belonged the fragments of a carved stone *chattrā* or umbrella, finished in the typical highly polished technique of the Mauryan Dynasty, which we know to have been the normal crowning feature of such structures.

We are to visualize our circular temple therefore as a shrine enclosing a relic-holding stupa and surrounded by a brick and timber inner wall, beyond which was a



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circular processional way within the outer brick wall. An abundance of baked clay tiles, and a characteristic pottery roof finial, showed how the temple had been roofed.

So far we have dealt with the visible foundations and wall-footings as excavated

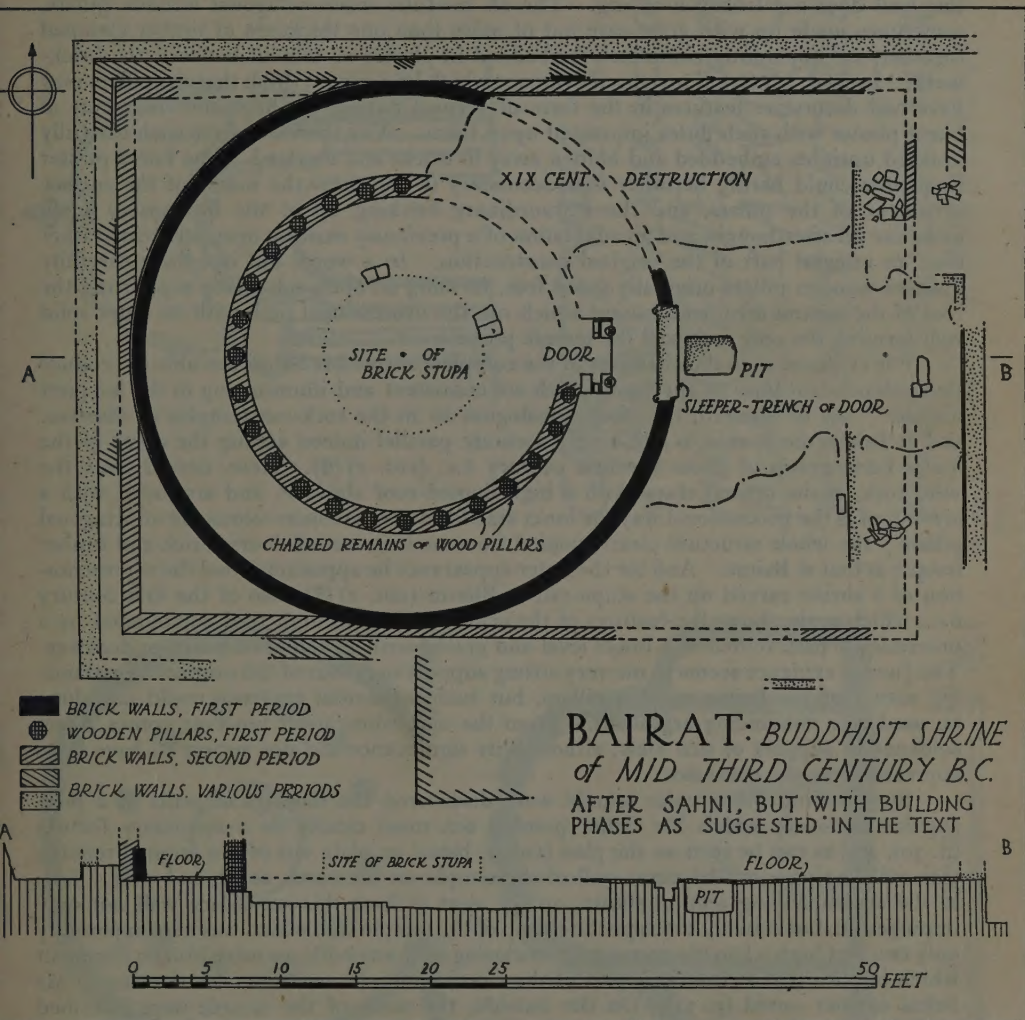


FIG. 1

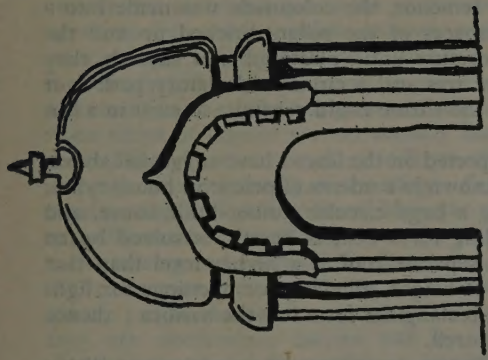
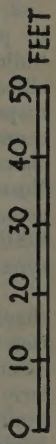
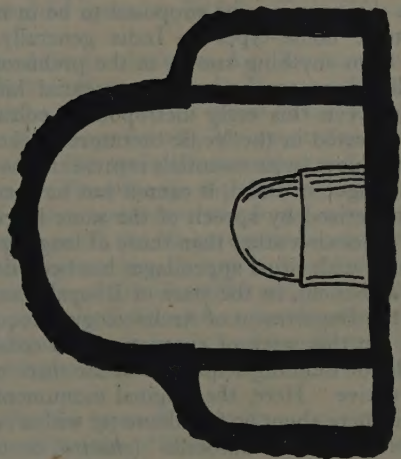
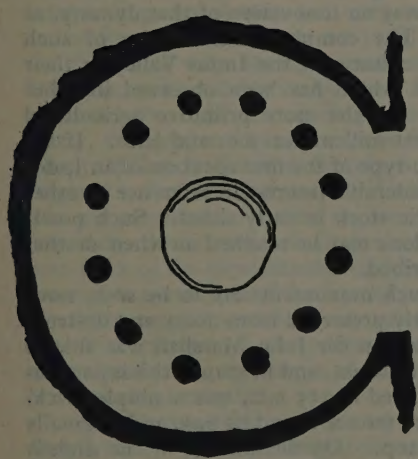
and published ; demonstrable facts about which there can be no dispute. But in considering how the temple was constructed above its lowest courses I cannot bring myself to agree with the excavator. The crux of the problem is the inner, brick and timber wall, which encloses what may be called the cella of the temple. Mr Sahni assumed, in no

uncertain terms, 'that the brick panels rose right up to the eaves' of the temple roof (p. 30). The wall would therefore have been, in his view, a solid and opaque barrier from floor to ceiling between the processional path and the stupa. Now on plan alone this wall does not look convincing. The 26 carefully made octagonal wooden pillars, sometimes made up with great care out of more than one thickness of timber clamped together, are apparently completely embedded in plaster or cement between the brick-work. Indeed, Mr Sahni instanced evidence which lead him to think that the pillars may have had decorative features in the form of vertical fluting, for he found fragments of burnt plaster with such flutes impressed upon them. Why therefore were such carefully finished uprights embedded and hidden away in bricks and mortar? The burnt plaster fragments could hardly be other than secondary if they bear the marks of the surface ornament of the pillars, and the extraordinary bricking up of the interspaces again looks like an afterthought and an adaptation of a previously existing open structure rather than an integral part of the original construction. In a word, did not these carefully finished wooden pillars originally stand free, forming an open colonnade supporting the roof of the central area, and around which ran the processional path with its outer solid wall forming the only true wall the temple possessed?

For evidence as to the character of the complete shrine Mr Sahni was able to produce two independent lines of approach which are consistent and illuminating in the happiest manner. As he showed, the closest analogues lie in the rock-cut temples or *chaityas*, and at Junnar he is able to cite a very accurate parallel indeed among the caves of the Tulja Lena group of about the first century B.C. (FIG. 2) (6). Here, carved from the solid rock, is the central stupa with a high domed roof above it, and around it with a lower roof is the processional way, its inner side formed of an open colonnade of octagonal pillars; the whole structure clearly copied from such an out-of-doors, brick and timber temple as that at Bairat. And for the outer appearance he appositely cited the representation of a shrine carved on the stupa-rail at Bharut (FIG. 2) (7), also of the first century B.C., which again shows the features of the central cella with high roof surrounded by a processional path roofed at a lower level and graced with an elaborate porch or doorway. The Junnar evidence seems to me very strong support in favour of the original free-standing nature of the Bairat wooden pillars, but such inferential evidence could not alone be used as a convincing argument. From the excavation itself however comes direct evidence in support of this view, although its significance did not appear to have been appreciated by the excavator.

Surrounding the circular temple were discovered the footings of walls of a rectangular enclosure which Mr Sahni pointed out must clearly be a secondary feature (p. 30), and as can be seen on the plan (FIG. 1, based on plate VIII of the original report), this wall impinges on the outer wall of the temple on the north, south and west. But, as the accompanying section shows, on the west at least this secondary wall not only impinges on, but actually overlaps the stump of the temple wall which was here apparently only two feet high when the rectangular enclosing wall was built—a mere broken fragment which implies that at least this part of the circular temple was ruinous at the time. Mr Sahni further noted (p. 31), 'On the outside, the walls of the temple were inscribed with Buddhist texts . . . of the Asokan period. Several bricks inscribed with one or two *aksharas* . . . were found built in the rectangular enclosure wall around the temple'. The obvious inference, that such inscribed bricks could only have been derived from a ruined and collapsed structure, was not made. In fact I see no escape from the conclusion that at the time of the building of the rectangular enclosure the circular temple was a ruin, at least so far as its outer wall was concerned.





CAVE-TEMPLE AT  
JUNNAR (PLAN & SECTION)  
AND SHRINE FROM THE  
BHARUT CARVINGS  
BOTH FIRST CENTURY B.C.

AFTER FERGUSSON, BURGESS,  
AND CUNNINGHAM

Surely we have here the clue to the extraordinary brick and timber construction of the inner wall. The temple was in ruins, from fire or other causes, roofless, its outer wall broken down and insecure, its wooden colonnade standing for part of its height at least. Reconstruction took the form of levelling the fragmentary outer wall, and building, partly over its footings, the large rectangular temenos wall, in which bricks from the old circular wall were re-used. And within this temenos, the colonnade was made into a solid outer wall around the stupa, the interspaces of the pillars bricked up and the columns themselves embedded in the new structure until, plastered over smooth, they were finally hidden from sight. Inside, there was still a circumambulatory path four feet wide between the wall and the stupa, and the shrine could continue to exist in a but slightly modified, though diminished, form.

The Bairat temple, if the evidence is interpreted on the lines I have suggested above, would be a member of a class of building well known to students of primitive house-types, where the problem of lighting and ventilating a large circular timber-built house, and particularly, in temperate climates, of providing for a central hearth, is solved by an inner circle of free-standing posts carrying a separate roof at a higher level than that springing from the wall-plate, the difference of height, allowing for openings for light or for the dispersal of smoke. Translated into rectangular form it is the basilica; thence the nave, aisles and clerestory of a medieval church.

Such circular buildings have a wide distribution among recent primitives, and have been discussed by Oelmann and others (8), and a particularly interesting variant, with the central space unroofed, occurred as the 'earth-lodge' of the American Indians in the last century. I have recently shown (9) that the type was not only known in northwest Europe in the Early Iron Age, but that its antecedents as houses and temples probably dated back to the second millennium B.C., in England and Holland. Belonging then to a family with a distinguished prehistoric pedigree in the northwest, this Bairat temple raises interesting possibilities as to the type of dwelling-house current in Mauryan times and, since the type may be supposed to be in no way an innovation of that dynasty, as to prehistoric house-types in India generally. The complete dissimilarity of such buildings from anything known in the prehistoric cultures of the Indus Valley or their allied civilizations emphasizes the essential hiatus which has been observed in other respects between this early metropolitan culture and the more primitive agricultural economy reflected in the Vedic literature of the first millennium B.C. and later. If the Bairat shrine does in its essentials represent a house-type of the first speakers of an Indo-European tongue in India, it cannot but have considerable interest in reference to other areas characterized by speech of the same linguistic stock in early times. Such possibilities of connexion other than those of language alone may be touched on when another type of stupa with ritual appendages has been described.

It is at Sanchi, in the state of Bhopal, that such monuments are to be seen, now, thanks to the Department of Archaeology, adequately preserved from decay and destruction (10). In this work of excavation and conservation Sir John Marshall was able to disentangle the building sequences of the three main stupas, and in stupa I this is particularly instructive. Here, the original monument, dated c. 255 B.C., was a simple brick-built hemisphere about 60 feet diameter with a raised terrace round its base and originally having a stone 'sacred umbrella' (*chattra*) on the top. On the analogy of the slightly later reconstructions a processional path (*pradakshina patha*) is inferred to have surrounded this, the earliest stupa. There was evidence of its mutilation at a subsequent date, but later in the Sunga dynasty enlargement and reconstruction of the monument on a grandiose scale was carried out over a period of about a hundred years ending in



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the first century B.C. The reconstructed stupa was a solid stone-faced dome, enclosing the original brick structure completely, and around it were placed the most remarkable balustrades, railings, and finally monumental gateways, made of stone but accurately copying a carpentry technique.

Around the edge of the ceremonial terrace and its approach stairways, and again outside this as a surround to the processional path round the base of the stupa, were set up stone balustrades which present, with their uprights, cross-bars and coping, an astonishingly faithful copy of a timber post-and-rail fence. The carpentry technique is slavishly followed; not only in the slanting joints of the latter, but in the mortices and tenon joints of the uprights and the sills and copings, while the cross-bars are solid stone strips of lentoid section actually inserted through holes cut in the upright stone posts (11). Another pseudoxylic fence, this time square in plan, surrounded the ritual umbrella at the summit of the stupa—fragments of such a *harmika*-rail of monolithic construction and dating from Mauryan times was found at Sarnath (12). The final embellishment of the structure was the addition of four richly carved gateways or *toranas*, each amazing and aesthetically distressing, as a tour-de-force of craftsmanship in forcing the recalcitrant stone to take on the inapposite characteristics of light and elaborate carpentry. The inscription on one gateway recording that part of the carving with which they are overloaded, carried out by the ivory-workers of the adjacent town (13), shows how some of the craftsmen employed were completely unused to stone-carving.

This type of monument described above—a stone-faced mound enclosing relics of Buddhistic sanctity, surmounted by the ritual umbrella and its square fence, and surrounded by balustrades, all carried out in stone but copying wooden prototypes—occurs not only elsewhere in the Sanchi group of religious buildings but at other sites in Central India—at Bharut (14), Amaravati and Bhattiprolu (15), and at Mathura (16), (the last being a stupa of the Jain sect), and all dated within the first two centuries. And in addition it should be mentioned that stone skeuomorphs of wooden fences occur surrounding, not stupas, but open rectangular areas, at Buddha-Gaya (Mauryan) (17), and at Sarnath (1st century B.C.) (18).

There is very strong presumptive evidence therefore for the existence in pre-Mauryan, and probably in Mauryan India too, of ritual wooden fences delimiting sacred areas and above all, surrounding cairns or barrows. But it is just at this point, unfortunately, that archaeological evidence fails us, except for the important clue in the use of wooden pillars at Bairat as described above. We are in the same position as we were in England before the discovery of Woodhenge; Stonehenge with its carpenters' technique in stone provided inferential evidence of timber structures which was not however confirmed by direct archaeological observation until the discovery and excavation of the post-holes of the great circular timber building nearby. It is to be hoped that eventually the timber prototypes of the Sanchi monuments will be identified and excavated, but their identification will not be an easy matter, either by field work or by observation from the air. Nevertheless, in their temporary absence some further archaeological deductions can be made from the stupas of the Sanchi types and the wooden elements they preserve in stone skeuomorphs.

Any literary evidence that may exist for the types of domestic or religious structures during the early period of the colonization of northern India by the first people of Indo-European speech is wrapped up in the intolerable obscurity of a primitive liturgical and rhapsodical corpus of hymns and sacred books. There are however suggestions in the Vedic Hymns of the ritual employment of stakes or pillars of wood set in the ground in connexion with the sacrificial post (19), and there is even a fairly specific reference

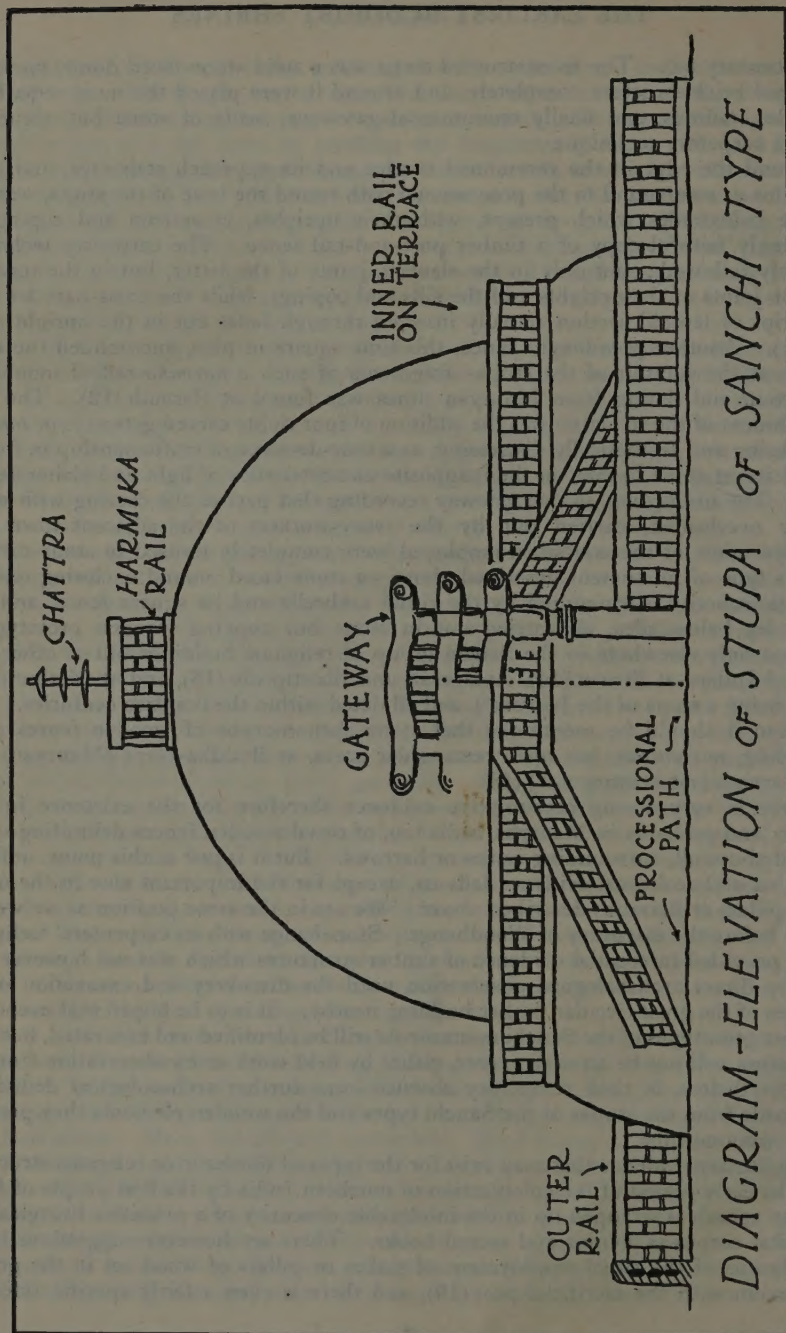


FIG. 3



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(*Rigveda*, x, 18, 4) to some form of barrier or boundary set between the living and the dead around the dead man's grave, which may refer to the wooden fence which the Sanchi stupas imply. The word employed is *paridhi* but it has no specified connotation other than a boundary (cf. Lat. *parietum*) though considered by the majority of the Hindu and European exegetes to have the force in this passage of a circular fence (20).

It can scarcely escape comment from a European archaeologist that the fencing round of a burial mound immediately calls to mind the Early Bronze Age barrows of the Dutch heathlands, with their encircling postholes so meticulously excavated by van Giffen and Bursch, and such British examples as Bleasdale and other sites (21). Mr Peake, with these analogues in mind, has followed up the old suggestion that the stupa really represents a pre-Buddhist type of barrow adopted for a specific ritual purpose, and given it added point in suggesting that the users of an Indo-European language who invaded India about 1500 B.C. from the northwest had been accustomed in their homeland on the steppes to fence round the barrows of their departed chieftains with a post-and-rail fence, which might serve not only the utilitarian purpose of excluding wild animals from desecrating the grave, but making an obstacle to evil-intentioned spirits, and help to keep within the magic circle the uneasy ghost of the deceased. This type of barrow would be continued to be built in the invaders' new territory, and the Vedic passage noted above may carry a reference to this construction. The Punjab and the upper Indus valleys are likely regions for the identification of such barrows, but circumstances natural and man-made are against their recognizable survival. Intense cultivation and a rainfall, which if of limited yearly duration is torrential while it lasts, would together conspire to level any mounds, while the thick coating of silt deposited by natural inundations and by irrigation would effectively prevent ploughed-out ditches from revealing their presence by the differential growth of crops.

In favourable areas however it might be possible by exhaustive field-work to identify such barrows and ultimately to excavate them, employing the techniques worked out by such European excavators as Bersu, van Giffen and Buttler for the detection of the fugitive features of organic substances such as timber in clay and sandy soils. If burials were identified, and characteristic potsherds or other artifacts defined, the possibility of recognizing settlements would be enormously enhanced. Prehistoric field-work in India, initiated so brilliantly in the desert areas by Sir Aurel Stein, and carried on in Sind by the late N. G. Majumdar, is still in its infancy. The outlines of the distribution of the earlier prehistoric cultures of the third millennium have been in part mapped out, but from the end of the Jhukar period and the late cemeteries at Harappa (22) to the temple at Bairat is an archaeological blank of nearly fifteen centuries; we are in complete ignorance of the material culture of that period of India's past during which a world-famous literature was produced in one of the earliest of the Indo-European tongues. The hints which we can gather from the monuments of a later epoch suggest the most intriguing possibilities of connexion in tomb-types and even building plans with the prehistory of the remote northwest; the confirmation or refutation of such possible parallels constitute in themselves a challenge to Indian archaeology. Here is a problem peculiarly Indian, touching on the deepest sentiments of a great sacred literature which has largely moulded contemporary Hindu culture and thought, yet with a world-wide interest to all speakers of the Indo-European languages and beyond. It is only to be hoped that conditions favourable to the investigation required may not be too distant, and that when the time comes there may be workers fitted to the task.

## AUTHORITIES AND NOTES

- <sup>1</sup> J. Fergusson, *History of Indian and Eastern Architecture* (1910), p. 65.
- <sup>2</sup> H. J. E. Peake. These views have not been published, but were communicated by letter to the author.—H.P.
- <sup>3</sup> cf. J. Marshall, *The Monuments of Sanchi*, 1, 21.
- <sup>4</sup> *Irag*, III, 159.
- <sup>5</sup> D. R. Sahni, *Archaeological Remains and Excavations at Bairat* (Jaipur 1937).
- <sup>6</sup> Fergusson and Burgess, *Cave Temples of India* (1880), plate XVIII, 3, 4.
- <sup>7</sup> A. Cunningham, *The Stupa of Bharut* (1879), plate XVI, upper relief.
- <sup>8</sup> Oelmann, *Haus und Hof in Altertum* (1927); Bersu in *Proc. Prehist. Soc.*, 1940, VI; Koch-Grünberg in *Archiv. für Anthrop.*, 1909, XXXV, 43; Fletcher and La Flesche in Twenty-seventh Annual Report of Bureau of American Ethnology (1905-6), 75, 97-8; Vayson de Pradenne, in *ANTIQUITY*, 1937, XI, 87.
- <sup>9</sup> S. Piggott, *Arch. Journal.*, 1939, XCVI, 193-222.
- <sup>10</sup> J. Marshall, op. cit. supra.
- <sup>11</sup> The Sanscrit name for these cross-bars is *suci*, literally 'needles,' from their being 'threaded' through the uprights.
- <sup>12</sup> J. Marshall, op. cit. 31-2.
- <sup>13</sup> *Epigraphica Indica*, II, 92, 378.
- <sup>14</sup> Cunningham, op. cit. supra.
- <sup>15</sup> A. Rea, *South Indian Buddhist Antiquities* (Arch. Survey of India, New Imp. Series, xv, 1894).
- <sup>16</sup> V. A. Smith, *The Jain Stupas and other Antiquities of Mathura* (Arch. Survey of India, New Imp. Series, xx, 1901).
- <sup>17</sup> Fergusson, op. cit. 102.
- <sup>18</sup> The excavators considered the arrangement of the stone 'fence' at Sarnath to be probably a reconstruction of an earlier structure. Sahni and Vogel, *Cat. Mus. Ard. Sarnath*, 1914, pp. 208-16.
- <sup>19</sup> cf. especially *Rigveda* III, VIII, a hymn to the Sacrificial Post in which the 'divine stakes', 'hewn and planted in the ground' are invoked to grant blessings for the crops and to bring wealth. They are later described as 'arrayed in brilliant colour' and 'decked with rings.' (Griffith's translation of the *Hymns of the Rigveda*, Benares, 1920, I, p. 327-29).
- <sup>20</sup> *Rigveda*, x, XVIII, 4. *Imaṁ jīvebhyāḥ paridhīm dadhāmi maisaṁ nu gādāparo arthametañ—* 'Here I erect this rampart for the living', in Griffith's translation (II, p. 406).
- <sup>21</sup> For references cf. Piggott, loc. cit.
- <sup>22</sup> For Jhukar and Jhangar wares and the late phases of the prehistoric cultures of the Indus Valley generally see N. G. Majumdar, *Explorations in Sind* (Mem. Arch. Survey of India), XLVIII, 1934, and E. J. A. Mackay, 'Excavations at Chanhu-Daro', *Journ. Royal Soc. Arts.*, 1907, LXXXV, 527-44.



# The Grey Wolf

by COLIN MATHESON

IN a previous paper (1)\* an attempt was made to describe the inter-relations of man and bear in Europe from early times to the present day. In many ways the influence of the wolf has been more important than that of the bear on the habits and thoughts of European man. Occasionally it has figured in a favourable light, as in the case of the she-wolf credited with suckling the twin founders of the City on Seven Hills (though even here the double meaning of *lupa*—applied in a transferative sense to ladies whose character would not bear close investigation—has led some authors to a conjecture which it might not have been politic to mention to any patriotic inhabitant of the grandeur that was Rome). But in general, whether in Italy or elsewhere, no animal has been so hated and feared. Among the ancient Greeks in the south—whose Lyceum at Athens and sanctuary of Apollo Lukeios at Sicyon may have originated in efforts to propitiate the wolves—as among the Letts of the north who, perhaps as late as the 17th century, sacrificed a goat each December to the wolves so that their other livestock might be spared (2); from Scotland where priests offered the prayer, quoted by Fittis (3) from the old Litany of Dunkeld, for deliverance ‘from robbers and caterans, from wolves and all wild beasts’, to Russia where peasants pronounced a spell on St. George’s Day with the recurring plea, ‘God grant the wolf may not take our cattle’ (4); the wolf was the great destroyer, the despoiler of flocks and herds and man’s chief enemy in the animal world.

There were adequate reasons for regarding the wolf as more dangerous than any other beast of prey. Second in size only to the bear among European carnivores, it is accustomed, unlike the bear but like many other Canidae, to gather in packs during the rigours of winter or when other circumstances compel or favour such assemblages, thus hunting down prey, some of which it might be beyond the power of any single wolf to attack. In 1875, it is recorded, no fewer than 161 human beings fell victims to these pests in Russia (5); in 1923 the herds of the Tsaritsin (Stalingrad) district are stated to have been reduced by 1500 head owing to the ravages of wolves, and a single village, Dvoinoia, lost 160 horses (6). In Italy they are said to have done considerable damage among flocks of sheep in 1928, killing 14 sheep and wounding 6 from one flock, then continuing their ravages for a considerable distance (7). Even in France, where they are almost exterminated, wolves nevertheless destroyed 13 lambs in the forest of Brigueil, in 1923; in 1914 a girl was killed in the forest of Cars, while the last human victim of wolves in France is stated to have been an old woman killed in October 1918, about ten kilometres from Chalus, Haute-Vienne (8).

This last date is a reminder of the fact that war has always been associated with an increase in the numbers and ravages of wolves. Early in the 15th century, during the fierce struggle between the Bourguignons and the Armagnacs, wolves became so numerous and daring that in a single fortnight they are said to have devoured 14 people in Paris ‘between Montmartre and the Porte Sainte-Antoine’ (9). Again, in July 1697, after the Peace of Ryswick, when the militia of Orleans had returned to their homes, the magistrates took the opportunity of employing them in large-scale battues against the wolves, which

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\* For authorities cited, see p. 18.

took toll even of the troops and also attacked women and children, up to the gates of the city. More than 200 wolves are stated to have been destroyed in these battues. A hundred years later, during the disorders following the Revolution, wolves multiplied in many districts, their increase being no doubt aided, if not largely caused, by the abolition of the fees payable for destroying wolves. During the royalist rising in Vendée the inhabitants suffered greatly from the attacks of wolves, and still more so when, after the defeat of the royalists, they were forbidden to carry arms. Eventually the republican authorities were forced to permit people in certain villages and farms to possess muskets for defence against these pests. About the same period, in the department of Deux-Sèvres, the sous-préfet of Thouars wrote to the préfet: 'Citizen, I have arranged several wolf hunts; they have been reasonably successful but the five or six wolves which have been killed are not even a palliative for the evil, which is so great, and the number of wolves so large, that complaints resound round me on every side'. He wound up by saying that there was not a night in which several cattle and sheep were not destroyed in every commune. And the commissaire Bisson wrote: 'To my own knowledge the wolves go about ten, twelve, and fifteen together, and throw themselves on the herdsmen who are guarding the flocks'. Authority was granted to arrange battues; in the year 9 of the Republic 124 wolves were destroyed in the district, 63 in the year 10, a number in each of the two following years, and 118 in the year 13. The bounties were revived, and according to the new scale the hunter who destroyed any of these beasts was paid 60 francs for a gravid female, 40 francs for other adult wolves, and 20 for a cub; for a wolf which had attacked human beings or was suffering from rabies the fee was 150 francs (10). In other countries as well as France the reduction or abolition of the bounties paid for wolves also led to an increased destruction of human life—in 1814, according to Weissenborn (11), 3 adults and 16 children were devoured by them in the Wongrowiec district in Posen.

Many of the foregoing records are probably referable to wolves hunting in packs. There are, however, some records of solitary wolves which would seem to have acquired a taste for human flesh, and like tigers in similar circumstances became a menace to the countryside. The most famous of these cases is associated with what became known as 'Bête du Gévaudan', since as Rollinat (12) tells us it was there, and in the south of Auvergne, from June 1764 onwards, that the ravages were committed. The Abbé Pourcher, priest of Sainte-Martin-de-Boubaux in the department of Lozère, as the result of careful investigations at the Bibliothèque Nationale, in the archives of Montpellier and other important towns in the region, and in the parish registers of villages where people had fallen victims, was able to publish in 1889 a book containing all the official records dealing with the matter. The ravages attributed to this beast have become matters of legend, and have naturally lost nothing in repetition. However, on the lowest of the estimates given by any author—which may not, on the available evidence, be very wide of the mark—about 60 human beings died in the district as the result of attack by a wolf and were partly devoured; while many more were injured. In the autumn of 1764, soon after the attacks commenced, when the country people had become thoroughly terrorized and were talking of 'un animal inconcevable, un Loup-Garou, un Sorcier', etc., a detachment of dragoons from Clermont, under Captain Duhamel, arranged numerous battues with the aid of the inhabitants, in order to destroy the animal to which the deaths were attributed. By the end of the year 74 wolves had been killed, but the attacks continued. Early in 1765, the Bishop of Mende ordered public prayers for delivery from the wolf. Large-scale battues, in which several thousand men from over a hundred parishes took part, were organized; and in February M. Danneval, a



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Norman squire said to have been responsible for the destruction of several hundred wolves in Normandy and adjoining regions, was sent by the king to Gévaudan, where he was later joined by his son, bringing with them their best hounds. But there was no cessation of the casualties, and early in June 1765, Louis xv instructed his Lieutenant des Chasses, Antoine de Bouterne, to proceed immediately to Gévaudan and Auvergne. It was not, however, until September 21, after several other deaths, that Antoine and his party shot a huge wolf (stated to have weighed 130 livres) which was generally believed to be the animal so long known as the Bête du Gévaudan, and which Louis appears to have accepted as such. According to Rollinat, however, although there was no more evidence of the beast for two and a half months, the attacks recommenced in December of that year, and continued on the same scale as before, various victims being not only wounded but killed and partly devoured; until after various great battues a hunter named Jean Chastel shot another large wolf in June 1767. It is stated that the stomach of this wolf was found to contain remains of a young girl killed less than 24 hours previously near Pébrac; after the death of this wolf the attacks on human beings are said to have ceased entirely. The king would not allow Chastel's claim to have killed the Bête du Gévaudan, and the hunter received no recompense from that source; the commissaires of the diocese of Mende thought differently, and awarded him a sum of money 'pour avoir tué, le 19 juin 1767, dans une chasse exécutée sur les ordres et sous la direction de M. le marquis d'Apcher, une bête qu'on présume, attendu la suspension des malheurs depuis ledit temps, être celle qui les causait'.

It is improbable, at this distance of time, that any more will ever be known about these occurrences than has been unearthed by the writers above quoted. The scattered official records, though not always in agreement, undoubtedly indicate the deaths of a large number of people—Rollinat quotes case after case for which he considers there is good evidence; nearly all children and women, as might be expected in attacks by a solitary wolf, though on several occasions men were attacked and injured. Whether more than one animal was concerned, or the wolf killed by Jean Chastel was alone responsible for all the misdeeds of 'La Bête du Gévaudan', is only one of several questions on which further evidence would be desirable but is not now likely to be forthcoming. We shall simply note here that the Bête du Gévaudan episode is estimated to have cost the State well over 29,000 livres—a considerable fortune for that period (13).

In some countries the ravages of the wolf have probably had their effect on burial customs. In northern Scotland, in the Edreachtillis district along the coast of western Sutherland, wolves are said to have so frequently dug up the bodies of the newly buried, that the inhabitants were forced to transport their dead for burial to the rocky island of Handa, off the coast (14). Millais records that when he visited the island about the beginning of the present century he was shown some stones which the local people described as remains of the old graveyard, and that two other small Scottish islands, in lochs in Ross-shire and Argyllshire, are reputed to have been used for the same purpose (15). Mrs D. Ogilvy has perpetuated, in her *Book of Highland Minstrelsy*, the tradition of the grey wolf in Edreachtillis which

'digs the dead from out the sod  
And gnaws them under the stars'.

There was another reason which contributed to the fear in which the wolf was generally held. This was the dread of rabies, which was frequently spread by the bite of a mad wolf among both human beings and livestock. In western Europe, where wolves have long been rare, rabies has usually been thought of in modern times as associated with dogs, and these have undoubtedly for long been the chief carriers; but it is

found also among wolves, foxes, and other members of the Canidae as well as among domestic and wild cats. About the time of the Gévaudan episode rabid wolves were recorded at various places in France, about 20 people having been bitten in a single day. The dread inspired by these beasts is indicated by the scale of fees already mentioned as having been put in force after the Revolution, according to which a wolf suffering from rabies fetched 150 francs. The number of people attacked by a single wolf may sometimes be considerable, since the animals when in this condition are stated to run at large through villages, biting and snapping at all whom they encounter. Rollinat mentions (16) many instances, and quotes two in particular in great detail—the first in the department of Puy-de-Dôme in December 1839, the second in Indre in July 1878, about which he made close enquiries, and about the second of which he gives various particulars from first-hand knowledge. Twenty-eight people are stated to have been attacked by the Puy-de-Dôme wolf, of whom 12 died of hydrophobia within periods ranging up to 39 days after having been bitten. In addition cattle and other domestic animals which had been bitten, subsequently developed rabies and had to be destroyed in some numbers; domestic dogs were killed off in the streets, and the alarm was so general—for wolves were then common enough in the department—that for a considerable time afterwards the villagers would not go abroad unless well armed. The rabid wolf destroyed in Indre department on 17 July 1878 had bitten seven people, 3 of whom died; as well as over 50 domestic animals—sheep, cattle, dogs, goats and pigs. All the dogs bitten were destroyed by order of the police, while several cattle and other livestock either developed rabies and had to be destroyed, or died. Eugène Foulatière, the young man responsible for the death of the wolf, received a medal and diploma from the French Government, as well as a gold watch from one of the chief Paris journals. Much further south, on the Mediterranean coast of France, various cases of rabies among wolves have been described by Caziot (17)—one in February 1788 at Saint-Martin-Vésubie, and some others a little later.

Other records from the extreme west to the extreme east of Europe suggest, even if we reserve judgment about the exactness of the statistics, how widespread, though only occasional, was the danger from rabies. From the farthest west, that is to say from Great Britain where the wolf has long been extinct, the only known record surviving seems to be that of the rabid wolf which in 1166, according to the *Annales Cambriae*, ran amok through the town of Carmarthen and bit 18 people, most of whom died (18). In eastern Europe, a rabid wolf is stated to have bitten 35 men and 23 women in the same Russian village, as well as 5 others elsewhere; of whom more than half succumbed (19).

It was shortly after this time that the researches of Pasteur led to the discovery of an effective treatment for rabies, and in March 1886 Pasteur had sent to him for treatment 19 Russian peasants from the neighbourhood of Smolensk, who had been bitten by mad wolves. Some of them were in a very bad condition on account of the severity of their wounds, and the danger was the greater because a fortnight had elapsed since they were bitten. It was known that among people bitten by rabid wolves the proportion succumbing to hydrophobia was very high, amounting often to more than 80 per cent. Nevertheless, after a course of treatment during which two inoculations each day were given, 16 of the Russians were saved and sent back to their own country. On behalf of these and others saved, the Czar presented to Pasteur a diamond cross of the Order of St. Anne, and 100,000 francs for the Pasteur Institute (20).

Incidents of the kind we have been quoting were not of course very common, but their occurrence at all, the terrible nature of the disease in its extreme form, and the slowness with which it sometimes developed, so that a bitten person might live in doubt and



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dread for weeks or even months afterwards, were factors which added to the fears of human beings in wolf-ridden areas. There was always the possibility that a rabid wolf had passed on the infection to other animals, so that the danger was not necessarily ended by the death of the original wolf. We may recall the serious spread, in modern times, of rabies by coyotes (relatives of the wolf) in the western United States (21); the malady began in central California in 1909 (when some rabid dogs entered the state), and in 1915 had spread over large areas in California, Oregon, Washington, Idaho and Nevada. Up to the end of 1923 there were records of 2000 human beings having been bitten, of whom 56 died—a much smaller proportion than in most of the European cases already mentioned, when no Pasteur treatment was available. In addition it is stated that in 1914–15 rabid predatory mammals, chiefly coyotes, were responsible for the destruction of five million dollars' worth of livestock in Nevada alone (22).

We do not propose to discuss here the belief in werewolves, since though generally attached in Europe to the wolf, it is a widespread belief in which the animal concerned varies according to the fauna of the country. Those interested in lycanthropy may find full information in *The Golden Bough* and elsewhere.

The destruction of the wolf, then, has been wherever possible carried on with vigour from the earliest times, and has led to its gradual extinction, or at least to a great reduction of its numbers, in most parts of Europe. There is little to add to Harting's account (23) of the destruction of the wolf in England except a few local records, one of which shows for example that the animals were sufficiently common in 1302 in Cheshire to constitute a danger to the deer forests and to necessitate the building of special traps (24); Harting concluded that the wolf had become extinct in England not later than the beginning of the 16th century. Fittis (25) and Ritchie (26) have discussed the disappearance of the wolf in Scotland, where it formerly swarmed and where local tradition or more definite record in Perthshire, Inverness-shire, and Argyllshire indicates that extensive forests had to be burned down to exterminate the pests; stray wolves may have lingered in the remoter districts until early in the 18th century. I have given elsewhere (27) some account of the wolf in Wales, where as in England it seems to have disappeared earlier than north of the Tweed.

In Ireland, as in Scotland, the species lingered till a comparatively late period, and it seems that the Irish hunted it with the aid of a swift breed of dog of the greyhound type (28). The history and appearance of the 'old Irish wolfhound' has been the subject of a voluminous literature, all of it interesting and most of it unreliable. We may here simply note the former existence of such a breed, which may be that referred to by Sir George Rawdon, agent to Viscount Conway, in a letter addressed to that nobleman from Moyra on 11 July 1657, about 'the dogs which it is a pity to send out of the country, especially one of them. They have been about "The Collen" and above Mr Doynes this six weeks, and had some courses at wolves which exceedingly infest this country'. In a subsequent letter of 7 October 1665, he refers to Tunny Park (along the edge of Lough Neagh) where 'the wolf . . . of late . . . hath killed 3 or 4 of a few mutttons . . . so I have put Totnall upon setting traps and watching with guns and Simon the keeper. The keepers and all our gun men are watching the wolves that haunt the Tunny Park almost every night' (29). By the close of that century the wolf had been practically exterminated in Ireland, but some records which may be valid would carry its final extinction well into the 18th century (30).

In France the official institution of the Louveterie has existed in one form or another from very ancient times. It is first heard of in the statutes of Charlemagne, in a passage commending the nobles to keep two hunters for the special duty of destroying wolves.

Charles VI authorized these 'louveteriers' to collect a tithe or fee within a radius of two leagues of the place where one of these beasts had been taken. Francis I placed the whole organization under a chief wolf officer—a Grand Louveterier. This office was later re-combined with that of chief huntsman, Grand Veneur; and at the time of the Revolution was abolished altogether, though as already mentioned, it was soon found necessary to revive both the Louveterie and the bounties for killing wolves. Napoleon I in 1805 ordered the appointment of lieutenants de louveterie, and this office, after varying fortunes and despite the practical disappearance of the wolves, has existed in various departments of France down to the present day.

At the beginning of the 19th century as many as 18,000 wolves are stated to have been killed in a decade, even these figures representing only those in the records of the lieutenants de louveterie. Thereafter the destruction of the wolves went on apace. In 1823 the total number recorded as destroyed was 2131. The fees paid by the Government showed a total of 700 wolves destroyed in 1840, and only 200 in 1860 (31). From August 1837 to August 1846, 47 were killed in the department of Seine-et-Marne (32), and soon afterwards the animal seems to have vanished from the department except for an occasional stray specimen, very probably from some other district. Aube, Loire, Landes, Loire-Inférieure, Oise, and Seine-et-Oise are among other departments from which Rollinat (33) and Feuillée-Billot could obtain no records of the occurrence of wolves for many years.

But the Franco-German war of 1870, like so many previous wars, appears to have resulted once more in an increase of the wolves, and for a considerable period afterwards several hundred were killed every year. Rollinat quotes figures to the effect that in 1877-8 a total of 555 wolves was destroyed in France. Brittany yielded the largest number, 52 being destroyed in Finistère and 41 in Cotes-du-Nord. None at all apparently were recorded for Deux-Sèvres, where they had formerly been so numerous; but the adjoining department of Vienne, one of the last strongholds of the wolf, where to this day wolves are stated to be seen every winter, gave the high total of 41, and Indre, adjoining Vienne, yielded 30. In the extreme east of France, in the Vosges and Haute-Marne, which together yielded 69 wolves, there was a third stronghold of the species; this was connected, by a series of departments running across central France and each yielding a few stray specimens, with the Vienne centre. The only other district where the numbers were large was the Basses-Alpes, which showed 23, with a few odd specimens in adjoining departments. The departments from which no wolves were recorded in 1877-8 numbered more than half of all in France.

At the present time only a few wolves survive in France, though war and other disasters may result in temporary increases. Even so, of more than forty departments in which wolves were recorded in 1877-8, less than half have yielded specimens (in no case numerous) from 1914 onwards, while a few stray wolves have occurred in other departments.

In Switzerland, the wolf was stated in 1837 to have been completely exterminated over much of the country, though still found in the south and in the cantons adjoining the French border (34). In the Geneva area 3 are said to have been seen in 1871; and 2 even as late as 1914 at Lignerolles in the Jura (35). In the canton of Fribourg wolves were numerous in the 16th century, on the plains as well as in mountain regions, and detailed records are available of the fees paid for killing them; there is stated, however, to have been a notable decrease during the 17th century, and entries of wolves from the lowlands disappear from the records; the species finally became extinct in the canton.



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Tessin was one of the last retreats of the Swiss wolves—no fewer than 53 were killed between 1852 and 1859; since that date they have hardly been met with there.

In Saxony, two successive Electors with the members of their courts destroyed in their hunts a total of 6067 wolves between 1611 and 1680 (36). In the German states, as in France and Switzerland and other European countries, it was a common practice to pay fees for the destruction of wolves. After the Peace of Tilsit, by which Posen was incorporated with the Duchy of Warsaw, the new government considerably lowered the premium previously paid by the Prussian government for the killing of wolves, which had been 6 dollars for an adult, 3 for a cub, and 1 for each embryo found in a female; the drastic reduction in the fees is reported to have led to a rapid increase of wolves between 1807 and 1815. When Prussia in 1815 regained Posen, the old scale of premiums was restored, general battues were held periodically, and regulations issued for poisoning the wolves with *nux vomica*. During 1815-9 a total of 4618 dollars was paid by the government in premiums. By 1816 wolves had become scarcer and the premiums were raised, yet only 1449 dollars were paid in 1831-6, for 256 wolves destroyed. About this time the farmers of Posen are stated to have had many losses of livestock owing to an influx of wolves from Poland, caused by the disorders following the Polish Revolution; and a society was formed for paying extra premiums—five times the amount of those allowed by the government—for killing wolves. As regards the Prussian districts on the left bank of the Rhine, 40 wolves were killed, and 256 dollars paid in rewards, in 1836 (37). In most parts of the Reich the wolf has long been extinct, and only now and again in modern times have a few been seen—probably wanderers from Poland and adjoining countries—in eastern Germany, where they are soon hunted down and destroyed. Germany, always solicitous for her game and livestock, gave the wolf short shrift. As soon as she had annexed Alsace and Lorraine after the war of 1870, systematic elimination of the wolves was undertaken and in the winter of 1871-2 500 were recorded as destroyed; 15 years later, it is stated, the species had disappeared from these provinces (38).

In Poland, in August 1837, 4 girls were killed in one parish by wolves (39). During the 19th century their numbers were reduced in many districts. The official figures for the forest of Bialowieza gave a total of 40 wolves killed in 1870, and 63 in 1871. According to Sztolcman (40), the indigenous wolves of Bialowieza, the famous bison reserve, became extinct in the seventies of last century, and since then only stray wanderers have been met with. In 1889 only one wolf was killed at Bialowieza, 5 in 1890, and 6 in 1891. The wolf, however, appears to have survived in some numbers in Poland, an official estimate for 1929 putting the number in the national forests as 2170 (41).

In Ruthenia, Hungary, Roumania and the Balkans generally, as in parts of the Baltic region, wolves are still found in considerable numbers; and they are common in many parts of Russia—at the great fair at Irbit in the Urals, in July 1917, the furs offered for sale included 1000 wolves (42). In southern Europe there are still a few in Spain, and in Italy they are stated to have been present in some numbers in 1928 in the Apennines, particularly in the Abruzzi in the region of the national park (43).

There are several animals the disappearance of which throughout most of Europe is, though in some cases inevitable, yet none the less regrettable; but the most ardent exponents of fauna protection—fortunately an increasing company at the present day—will see in the reduction of the wolves only a necessary step in man's control of his environment.

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# Rotary Querns on the Continent and in the Mediterranean Basin

by V. GORDON CHILDE

IN his two articles on querns (1)\* Dr Cecil Curwen has given us a really epoch-making contribution to prehistory and history. Not only has he provided the prehistorian with a new instrument for the establishment of chronology, but he has drawn the attention of excavators to a revolutionary but curiously neglected advance in technology. For the rotary mill is the first major application of rotary motion since the invention of the potter's wheel and the lathe in the remote Oriental Copper Age; it led on directly to the invention of geared machinery and the water-wheel and so to the first employment of inanimate motive power apart from the harnessing of the winds to the sail. Though this invention took place in the full light of history, the sole evidence for its origin, apart from a single reference in a writer so late as Pliny (2), is purely archaeological. Unfortunately it is still rather thin; excavators of classical and barbarian sites have generally been too preoccupied with statuary and art-objects on the one hand, with types accepted as chronologically significant on the other, to provide the historian of science with the data he craves. Truhelka for instance, generally so scrupulous in the full publication of all his finds, does not illustrate nor even describe a single quern from Dolja Dolina in Bosnia where he found plenty (3).

The point of the present paper cannot be to solve the problem, still less to refute Curwen's views, but simply to encourage archaeologists when they again have opportunities for visiting Continental museums to collect the information that is probably still lying therein, covered with dust in cellars and under cases. Only when these data are collected in the form to which Curwen has now accustomed *ANTIQUITY's* readers, can a serious history of rotary mills and their diffusion be attempted. For it will appear from the fragments of evidence already available that the issue is even more complex than the unwary reader of Curwen's lucid expositions might realize, and that facts can be cited which might modify his account even of the British development.

Firstly, while in Northern Europe outside the Celtic (*La Tène*) province, i.e. in 'Free Germany' (4) and Scandinavia (5), no sort of rotary quern was current till A.D. III (so that a 'Nordic' origin for the invention is excluded), tantalizing hints suggest the co-existence of *two* families in our Continent. In Cis-Alpine Europe, indeed, throughout the *La Tène* province right to its remotest outposts like Poiana on the Sereth in Moldavia (6), something externally like the British beehive can be traced by II or I B.C. The hopper at the top and the lateral socket for a radial horizontal handle can be also recognized in published illustrations. Beyond that the few specimens adequately described (7) betray considerable variation in detail: the grinding surfaces seem often rather flatter than in southern England; at *La Tène* itself Vouga contends that the whole machine consisted of three distinct stones—the beehive-shaped rider, 16 cm. high by 36 cm. in diameter, with hopper and handle-socket; a flatter disc, only 6 to 8 cm. thick but also pierced right through, and a base bearing only a blind socket for the

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\* References and notes are on pp. 25-6.

spindle and with a gently tilted surface. South of the Alps similarly shaped querns are known from Algeria (8) and Delos (9).

From Delos besides the beehive or rather trunco-conical riders with horizontal handles flatter discs, probably with vertical handles, are reported by Déonna. None are very precisely dated. But some beehives come from areas that were scarcely inhabited before 246 nor after 88 B.C. So they may be accepted as going back at least to II B.C. But by that time donkey-mills, too, were at work on the island. Chamonard figures a characteristic hour-glass mill of Pompeian type, and found on the floors of several houses (10) circles of stone slabs that must have served as steps for beast or man working a revolving mill of this kind. Such co-existence plainly accords well with Curwen's thesis that our rotary querns derive from donkey-mills in the East Mediterranean.

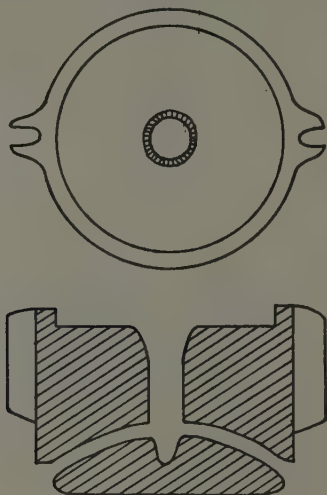


FIG. 1. IBERIC QUERN (10)  
after Anuari

But there is another family of querns best represented in the Iberian Peninsula all apparently characterized by a *vertical* handle. One variety is well illustrated in the Iberic citadels of El Piuro del Barranc Fondo and Sant Antoni in Catalonia (11) dated by Bosch Gimpera to IV-III B.C. (!) and pretty certainly pre-Roman. The nether stone is slightly convex. The rider is externally cylindrical save for a pair of *vertically* slotted projections for the handles; the hopper on top is shallow and flat-bottomed, not funnel-shaped (FIG. 1). The lateral projections recall those that are found, unslotted, on the rubbers of saddle querns of the preceding first phase of Iberic Iron Age culture in Catalonia (12). In the Celtiberic west of the Peninsula, too, rotary querns seem to have been in use before the Roman conquest of Numantia in 150 B.C. The descriptions and photographs of these are summary and leave much to be desired (13); but none are beehives though the nether stone is definitely convex. Schulten (14) in describing those from Celtiberian Numantia is most explicit: 'the ring-shaped rider has in the upper side near the edge a hole for the handle, often two holes; the rim is strengthened at the relevant point'.



## ROTARY QUERNS—CONTINENTAL AND MEDITERRANEAN

Thus there existed in Spain by 11 B.C. a group of querns, quite distinct from the Celtic and Hellenistic beehives, being both flatter and fitted with vertical handles. In the latter respect the Spanish querns lack one of the most decisive features linking the beehive quern with the donkey-mill. Do these querns perhaps give a clue as to the character of the *molae hispaniensis* that Cato (15) recommends for an olive yard in addition to *molae asinariae* and *molae trusitalis*? And are these West Mediterranean mills necessarily descended from an East Mediterranean ancestor?

In Classical Greece the normal corn-grinding implement attested archaeologically

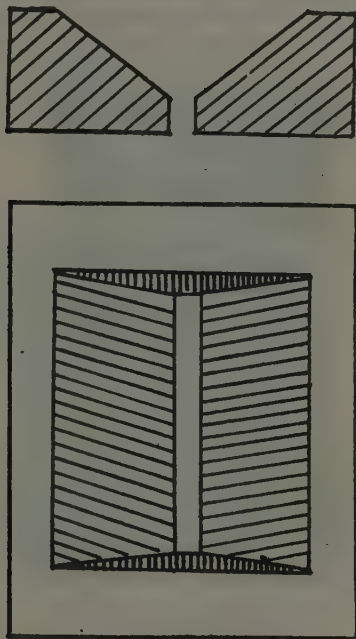


FIG. 2. CLASSICAL 'HOPPER-RUBBER' (10)

was some sort of push quern in which the upper stone was pushed to and fro and not rotated. In 1899 Lindet (16) called attention to fifth-century illustrations of what he takes, probably correctly, to be the old saddle quern being worked in the manner so familiar from Egyptian models and paintings. Still it is not the simple saddle quern that is best attested in the Classical period, but an improved version in which the rubber is rectangular in plan and section, and provided with a hopper on the top from which the grain passed through a narrow slit on to the grinding surface (FIG. 2). Elton (17) was the first to recognize these objects as corn grinders. They are very common at Olynthus (18) where they are well dated to fifth-century B.C., and occur also in Aegina, Eretria, Delos, Priene, Thera, Phaestos, Methana and Demetrias in Old Greece, at Caulonia (19) and Sesso Orlando in Magna Grecia, the Greek settlements of Tanis and Naukratis in Egypt, and even at Gordion in Phrygia (20), Alishar in central Asia

Minor (21), and Tell Halaf on the Khabur in North Syria (22). An oval variant with projections at the ends presents a certain analogy to the early Iberian rubbers mentioned above. The lower stone was not, apparently, saddle shaped but a large tabular block; its surface was normally scored across all over (FIG. 3).

The *hopper-rubbers*, as I propose to call the device, were generally of considerable size—60 cm. long, 50 cm. wide and 20 cm. thick. Most are provided at each end with a slot in the upper edge. The significance of this feature was first explained by Kurouniotes in 1917 (23). He drew attention to a scene in a bakery depicted on a 'Megarian' bowl of III B.C. The heavy rubber was attached by the slots or loops to a horizontal wooden bar one end of which was pivoted. By pushing the other end to and



FIG. 3. UNDERSIDE OF RUBBER AND  
NETHER STONE, DELOS (15)

fro a man moved the rubber over a broad stone-topped table (FIG. 4). The 'pushing mill' (*molae trusitalis*), at which Plautus is said to have worked as a slave and which Cato recommends for use on an olive farm, is more likely to have been this device than 'so insignificant a contrivance as a single saddle quern'.

Now while this form of manual mill was still in use in Greece in III B.C. it was by then certainly used side by side with donkey-driven rotary mills. For such a mill of Pompeian form with its donkey is depicted between two manual mills on the Megarian bowl just mentioned (FIG. 5). But before this date I can find only three direct archaeological indications of the use of any sort of rotary corn-mill—and I may admit that I find none of the earlier literary references at all convincing by themselves (24). In Sicily, Orsi (25) claims to have found under the Athenaion at Syracuse and in a stratum between the Siculan (III) and archaic Greek (*paleogreca*) the rider of a rotary quern that would in Britain be classed as Romano-British at earliest; for it is 35 cm. in diameter but only 9 cm. thick at the centre and 5.5 near the margin; the handle-socket is vertical; both



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it and the central pivot-hole are surrounded with raised mouldings. I must confess to a certain hesitation in accepting the excavator's stratigraphical observations in attributing such a quern to VII B.C.

Again from Sicily, this time from the Phoenician colony of Motya that was destroyed in 397 B.C. (26) comes a nether mill-stone, dated to V B.C. It is conical, 1.30 m. in diameter and 40 cm. high and therefore large enough to be the *meta* of a Pompeian donkey-mill. Finally the American excavations at Olynthus have produced a fragmentary mill that must again go back to V B.C. which Robinson (27) describes as follows: 'a smaller rougher section, 1.19 m. in circumference, goes below; a larger with raised band on the outer edge and grooved inside goes above. There is a square hole in the middle. The height is 34 cm., of the upper section 25 cm., the upper diameter 51 cm.'. This is interpreted as a hand-mill in a later report.

Other industries, however, provide evidence for the use of grinding appliances based on the rotary principle in Classical Greece. From the silver mines at Laurion,

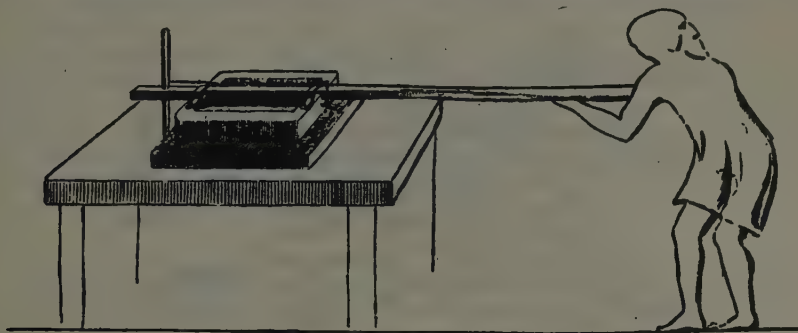


FIG. 4. RECONSTRUCTION OF PART OF SCENE ON A MEGARIAN BOWL  
after Kurońiotes

the most intensive exploitation of which took place in V and early IV B.C., Ardaillon (28) figures a mill, exactly similar to the Pompeian donkey-driven corn-mill, that he supposes was used for grinding ore. Curiously enough the same author mentions from the mines what he calls 'sieves', presuming them to have been used in the industry, but his figure (29) shows that they are identical in form and dimensions with our hopper-rubbers. Secondly, at Olynthus, Robinson (30) found remains of an olive press with unmistakable *orbes* that show it to have been of the *trapetum* type (31). Now the *trapetum* is again a machine that revolves.

Hence the existence of rotary mills in Greece and Sicily too that Curwen inferred from the literary evidence, may be regarded as archaeologically established. That the new idea originated in Greece is less certain. The distribution of the earliest dated instances and of rotary querns in Hellenistic times is quite compatible with a more westerly centre of dispersion—Carthage, Sicily or Italy. Indeed it gives some support to the tradition reported by Pliny from Varro that rotary mills were invented at Volsinii (32). Nevertheless there is just a hint that the home of the invention should be sought even further east than the regions hitherto surveyed. In Palestine small rotary grinding (?) appliances turn up apparently already in Philistine times. Macalister describes them thus (33); 'two hemispherical stones, four to six inches in diameter, with

their plain faces in contact and a raised collar round the nether stone into which the upper fits; a tenon in the middle of the nether fits into a mortise in the upper'. Commander Schaeffer tells me that similar pairs of stones occur at Ras Shamra in Late Bronze Age levels before 1200 B.C. They are clearly too small for grinding grain and have been explained as paint-grinders. They certainly did not develop into querns in Palestine. But of Tell Halaf von Oppenheim writes, 'Also (i.e. beside ordinary saddle querns and hopper-rubbers) there were round millstones; these have a prong in the middle fitting into the other stone; this has a hole in its side into which a wooden stick was thrust by which the stone was turned on the millstone'. These are not at all accurately dated; the floruit of the city was under the Aramaic king Kapara (? IX B.C.), but Assyrian and Hellenistic remains were also found. Further east neither the Assyrians nor the Babylonians used rotary mills. But it may turn out that the Phoenicians or some people in Asia Minor developed the old Syro-Palestinian 'paint-grinder', through some device like that just described, into a true rotary quern. For the moment no



FIG. 5. PART OF SCENE ON MEGARIAN BOWL  
after Kurouniotes

evidence for this is known to me, and we must confine our survey to the better explored Mediterranean.

Orsi's quern from Syracuse, if his dating were accepted, would refute the suggestion that rotary querns were adapted from rotary donkey-mills (34). But apart from it, the mills seem to be attested as soon as the querns, so once more Curwen's surmise seems to be justified by the available archaeological evidence though this is not conclusive.

Still I doubt whether the rotary hand-mill was an adaptation of the corresponding donkey-mill 'for the benefit of peasants who lived far from towns and still had to grind their own corn at home' (35). Such consideration for the needs of the peasantry seems quite foreign to the spirit of bourgeois society in Hellenistic and Roman times. There were people more important in the townsman's eyes who also had to convert their grain into flour themselves—firstly the soldiery. An army on the march could conveniently carry with it neither donkey-mills nor the fixed manual mills with hopper-rubbers and large tabular nether stone. Writing of an expeditionary force Xenophon recommends explicitly, 'we must provide ourselves with hand-mills to grind our grain in; for this is the lightest of the flour-producing instruments' (36). That Xenophon's hand-mills were rotary querns is not of course to be inferred from the text. But as soon



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as the advantages of rotary motion were recognized, the principle would surely be applied to the army hand-mills. In the Roman army the conversion had been demonstrably completed by 150 B.C. judging by the querns found in the besiegers' camp at Numantia (37); these were certainly rotary and that apparently of the Spanish form with a vertical handle-socket in a lateral projection from the edge of the rider. Now it is known that a hand-mill (*molae manuariæ*) belonged to the equipment of each *contubernium* of five to ten men. The finds of querns in the camps round Numantia illustrate conformity to this prescription already in 11 B.C. Under the Empire it still held good. But now the hand-mills are contrasted to *molae machinariæ*, large fixed mills with a rider 75 cm. in diameter attached firmly to an iron spindle bearing near its lower end a gear-wheel that probably engaged a wheel revolving in the vertical plane and operated by a slave (38). The gearing is the same in principle as in the water-mills described by Vitruvius (39).

The role of armies thus equipped as agents in the diffusion of rotary querns can hardly be overestimated and is illustrated by the British material collected by Curwen. But another distributive agent might be the merchant ship. Herodotus' account of the Phoenicians' circumnavigation of Africa under Necho, whatever be thought of the voyage itself, assumes as the normal procedure that a ship destined for a long voyage carried supplies of unground grain. It must therefore have carried mills for grinding this grain, and on shipboard light hand-mills would be more appropriate than the heavy stationary mills of the types described above. An enterprising merchant-captain would be likely to secure the most efficient hand-mill as a general rule. Is it too far-fetched to imagine a Pytheas or an Himilco bringing rotary querns to the remote *Pretamikai Nesoi*?

Be that as it may, the recognition that more than one type of rotary quern was current in the Mediterranean basin in the latter half of the last pre-Christian millennium should warn us against any dogmatic attempt to derive all British querns from one single type—the Celtic beehive, though that was certainly the first adopted in southern England. In particular may not the flattish Spanish querns with vertical handles perhaps explain the appearance at Cush in co. Limerick of rather similarly shaped querns in a context claimed by O Riordain (40) to be still Late Bronze Age? If derived from the Iron Age B querns of southwestern England, it would be hard to put these Cush specimens before A.D. 1, and that is rather late for even a very provincial Bronze Age. For that matter the Scottish broch-querns of A.D. 1 (?) might also be assigned to the Spanish family.

### REFERENCES AND NOTES

- <sup>1</sup> ANTIQUITY (1937), XI, 133-51; (1941), XV, 15-32. <sup>2</sup> N.H., XXXVI, 29.
- <sup>3</sup> WMBH (1904), IX, 66, they included some sort of rotary quern.
- <sup>4</sup> Götze, *Reallexikon der Vorgeschichte*, VIII, 323, knows only one example during the Römisch-kaisarzeit, while east of the Elbe such appear first in Slavic settlements.
- <sup>5</sup> Hatt, *Landbrug i Danmarks Oldtid*, 125.
- <sup>6</sup> Dacia, III-IV, p. 345, from stratum v with La Tène III and Nauheim brooches, 50 B.C.—A.D. 50.
- <sup>7</sup> Vouga, *La Tène*, 77-80, pl. XXVI; *Anz. f. Schweiz. Altertumsk.*, XIX, 165-7 (Gaz-Fabrik, Basel); *L'Anthr.*, 1903, XIV, 403 (Celles, Cantal); cf. also Déchelette, *Manuel*, II, 3, 1387 ff.; *West-Deutsch. Zeitschr.*, XIX, 139; Schráníl, *Vorgeschichte Böhmens und Mährens*, 246.
- <sup>8</sup> cf. Delamare, *Exploration scientifique de l'Algérie*, IX.

- <sup>9</sup> Chamonard, *Explorations archaéologiques de Délos*, (1922), VIII, 229; cf. Déonna, *ibid.* XVIII, 131.
- <sup>10</sup> e.g. in Rue du Theatre, 26, 27 b, 33, 41 b, etc.; Chamonard, *Délos*, VIII, 211.
- <sup>11</sup> *Anuari d'Estudis Catalans* (1915-20), VI, 654, 660; cf. 663.
- <sup>12</sup> *ibid.* 647, fig. 469.
- <sup>13</sup> From Izana, Soria; Las Cogotas, Avila; Troña, Pontevedra—Junta superior de Excavaciones, *Memorias*, 86, pl. I; 110, p. 85; 115, p. 35. Saddle querns were also used in these forts and at Numantia.
- <sup>14</sup> Schulten, *Numantia*, II, 244. <sup>15</sup> R.R. X, 4. <sup>16</sup> *Rev. Arch.*, xxxv, 419; cf. xxxiv, 11.
- <sup>17</sup> Bennett and Elton, *History of Corn Milling*, I, 1898, 54-6.
- <sup>18</sup> Robinson, *Excavations at Olynthus*, VIII, 'The Hellenic House', 330 ff., and Déonna, *Délos*, XVIII, 127, give a full bibliography.
- <sup>19</sup> *Mon. Antichi*, xxiii, 730-1, fig. 154; described as a window (!) but securely dated VII-VI B.C.
- <sup>20</sup> Körte, *Gordion*, 176, undatable.
- <sup>21</sup> O. I. C., van den Osten, 'The Alishar Hüyük', I, 112; II, 77; most probably older than III B.C.
- <sup>22</sup> Von Oppenheim, *Tell Halaf* (Eng. trans.), 206, pl. XLIX, B.
- <sup>23</sup> 'Αρχ. Έφ., 1917, 151; the bowl is published *ibid.*, 1914, pl. I, and another in Rostovtseff, *A Social and Economic History of the Hellenistic Age*, pl. xxv, p. 176.
- <sup>24</sup> None of the references to corn-grinding in earlier Classical authors, nor in Hebrew and Oriental texts, necessarily imply rotary motion though most commentators (e.g. Blumner, *Technologie und Terminologie der Gewerbe bei Griechen und Römern*, 1875, pp. 23-49) through unfamiliarity with archaeological evidence have assumed they do. I am not sure that the late lexicographers of antiquity had any better grounds for their explanation of the use of *δνος* for the upper millstone.
- <sup>25</sup> *Monumenti Antichi*, xxv, 568, and fig. 159.
- <sup>26</sup> Whitaker, *Motya*, p. 281, fig. 63. <sup>27</sup> Robinson, *Olynthus*, II, 55, cf. VIII, 331.
- <sup>28</sup> 'Les Mines de Laurion', *Bibl. École franç. à Athènes*, no. 77, p. 61, fig. 19.
- <sup>29</sup> *ibid.* 68. <sup>30</sup> Robinson, *Olynthus*, VIII, 338.
- <sup>31</sup> Drachmann, *Ancient Oil Mills and Presses* (Lindiaka), 8.
- <sup>32</sup> N.H., xxxvi, 29 'molas versatilis in Volsiniis inventas'.
- <sup>33</sup> Macalister, *Gezer*, II, 37.
- <sup>34</sup> Note that in a small hand-mill from Pompeii (Villa Boscoreale, *Mon. Ant.*, VII, 491), the rider is cylindrical externally, not beehive-shaped, though internally hour-glass shaped like the *catullus* of contemporary donkey-mills; the handle-socket is horizontal, the *meta* markedly convex though less so than in the mills.
- <sup>35</sup> ANTIQUITY, 1937, XI, 140.
- <sup>36</sup> Cyropaedia, VI, 2, 31: χειρομύλας χρὴ αὐτόθεν παρασκευάσασθαι αἷς σιτοποιούμεθα τοῦτο γὰρ κοινώτατον τῶν σιτοποιητικῶν ὀργάνων.
- <sup>37</sup> Schulten, *Numantia*, III, 264, and pl. 29, 3; IV, 139.
- <sup>38</sup> *Saalburger Jahrbuch*, III (1912), 89 ff.
- <sup>39</sup> *de Architectura*, X, cap. IV. <sup>40</sup> *PRIA*, XLV, C, 83-181.



# The Sailing Ship in Ancient Egypt

by JAMES HORNELL

MANY attempts have been made to elucidate the problems created by a critical examination of the obscure constructional methods employed by the Ancient Egyptians when building sailing craft for use on the Nile and, alternatively, at sea. None has proved entirely satisfactory. Two reasons are chiefly responsible; the first is lack of adequate knowledge on the part of most writers of the mechanical principles governing ship designing at the present day; the other is a similar lack of any wide and intimate acquaintance with the designs followed and methods employed by peoples who retain primitive features in the construction of their sailing craft, particularly on the Nile in its upper reaches beyond the confines of Egypt. That it has been my good fortune to have had opportunities to study at first-hand the construction of sailing craft in every important quarter of the world, and, in especial, that of those in use on all sections of the Nile from its mouths to its source in Uganda, is my excuse for the present attempt to explain away some of the difficulties that have troubled or misled so many previous writers on this subject.

Detailed study of the sailing vessels employed between the second cataract and the southern limits of navigation on the Nile and its great tributaries, proves beyond the shadow of a doubt that the type of hull in all the sailing craft trafficking in this region is directly comparable, in the basic features of its design, with those characteristic of the boats found in a 12th Dynasty tomb at Dahshūr and now safely housed in the Cairo Museum. We may, indeed, go even further and infer with confidence that these Sudanese craft, so far as their hull form is concerned, are the direct and lineal descendants of the Egyptian river craft of early and middle dynastic times.

All modern native-built sailing vessels found south of the second cataract are constructed to one unvarying design, characterized by the entire absence of ribs and by such shallow depth and great beam as to give them a distinctly spoon-shaped form (PLATE I, B). Only in sail rig does any great difference exist. Those found south of the fifth cataract are lateen-rigged except in the case of small sizes used for fishing and as ferry-boats—these hoist a light square sail, hung from a horizontal yard, and without a lower yard or boom. Farther down the river, the boats plying between the fourth and the second cataract, use an oblong sail slung obliquely from the mast head; it has a yard along the head and another along the foot and can be furled around the lower yard by means of a rod, the turning 'handle', inserted crosswise through the heel of this yard (PLATE I, A).

## PART I—THE HULL

The hull, whatever be the rig, is always built on the same principles, but dimensions and proportions vary widely. No hard and fast rules would seem to govern the measurements but results prove that what appear to be purely rule-of-thumb methods are sufficient to enable the builders to turn out boats adequate to stand up to the arduous conditions of their lot. As with the British boat-builders of the smaller wooden fishing craft during the immediate past, long experience and the inheritance of a few simple formulae handed down from father to son, suffice these Nilotic craftsmen.

## ANTIQUITY

Out of a large number of Nilotic cargo boats of which I possess the dimensions, the largest, built at Omdurman, measured 18.80 metres (61 ft. 9 in.) in length by 7.25 m. (24 ft.) beam, a ratio of 2.6 ; thickness of hull planking, 3 inches. The crew numbered six and the cargo carrying capacity was 303 ardebs—about 45 tons.

The timber used in construction is invariably one of the local acacias, usually the *sunt* (*Acacia nilotica*), an extremely hard wood but brittle and troublesome to work. It is difficult to obtain in long running lengths, so, apart from the keel plank, the hull is built up of comparatively short lengths of thick planking halved together in the strakes ; usually they run from 4 to 6 feet long, though I have seen a few running up to 8 feet. The rougher and cheaper the boat, the shorter are these planks and we then appreciate how apt is the comparison made by Herodotus (II, cap. 96) when he likens the boat construction of the Ancient Egyptians to the laying of bricks in the building of a wall.

Boat-building activity on the Nile begins as soon as the river falls sufficiently to expose a suitable stretch of sandy shore, for work must be completed before the river rises again, in order that the boat may float off the stocks without entailing danger and trouble during launching ; deformation of the hull is liable to occur if it be unevenly supported before being fully afloat.

To obtain a suitable length of timber to form the stout keel plank is the builder's greatest difficulty. *Sunt* seldom grows straight and still more rarely is it found of length sufficient for this particular purpose ; if unable to get timber long enough, two or even three lengths must be scarfed together and this entails undesirable weakness. Timber for the side-planking or strakes is fairly abundant, for here curved lengths are actually useful for the bent planking required by the design in the bows and quarters. Normally the keel plank slightly exceeds the thickness of the side planking ; on the underside from about mid-length to the forefoot it gradually increases in thickness until it reaches a maximum keel-like projection below the adjoining planks of from 2 to 2½ inches ; it is often left rough below. This arrangement is intended to provide a margin against the extra wear occasioned at the fore-end by frequent groundings. These boats are usually loaded so as to be slightly down by the head ; as the fore-end will thereby ground first, this arrangement facilitates the work of getting free.

On the inner side the keel plank also projects slightly—usually about one inch—above the surface of the adjoining plank on each side. The builders appreciate the advantage of having the keel plank as massive and strong as is possible in order to secure longitudinal strength ; if it were not imperative to keep the draught low, it is probable that a true keel would have been evolved and used whenever timber of suitable size could be obtained.

When the keel-plank baulk has been squared and cut to the requisite dimensions, it is placed upon stocks. These consist of 3 or 4 stout, short posts set upright in the sand. To ensure the requisite greater depth forward, the head end of the keel-plank is set at a slightly lower level than the after end (PLATE III, A). A curved stem post is then nailed on at the head and held in place by a stout slanting shore. The middle section of the lowest side plank (the garboard strake) is next nailed to the keel plank on each side and then the triangular stern frame is built on to the after end. This is formed of a vertical stern-post having two divergent arms, the whole forming a trident frame, arms upward. Cross planking is subsequently nailed upon the outer face of these arms to form the transom stern. After this the sides are raised to their full height by nailing planks edge to edge in successive strakes running from stem to stern, with intercalated 'stealers' wherever necessary. The thickness depends upon the size of the craft required ; it is seldom less than 2½ inches and in large craft may rise to 3 and even 3½ inches. All the





(A) A DONGOLA MARKAB UNDER SAIL, 1939  
shows the sail being furled around the lower yard; on the sail is the rude (amuletic)  
figure of a crocodile. (This type of sail is, today, characteristic of Indonesia)



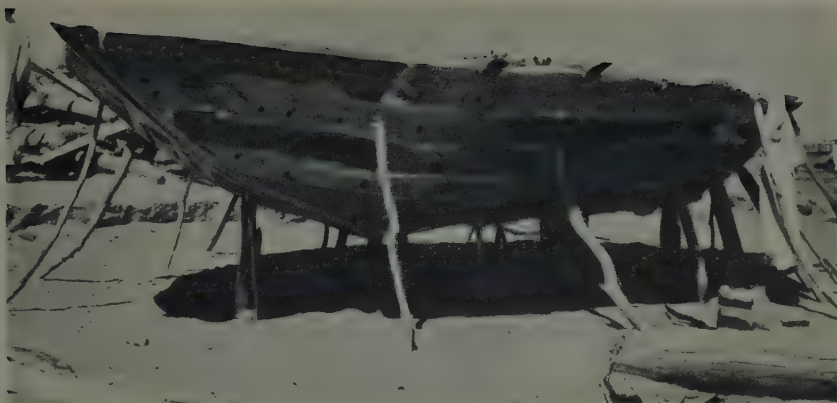
(B) A SMALL NUGGAR (*Gharab*) OF THE UPPER NILE  
showing construction without ribs. South of Malakal, 1939  
Phs. J. Hornell

PLATE II



A CARGO NUGGAR AT ABU RUF, OMDURMAN  
showing the great use made of mast stays to prevent spreading and hogging  
*Ph. J. Hornell, 1939*

### PLATE III



(A) A NUGGAR ON THE STOCKS AT OMDURMAN, 1939  
The forefoot is appreciably lower than the rest of the keel plank  
*Ph. J. Hornell*



(B) A BALSA FISHING CANOE, LAKE TITICACA, SOUTH AMERICA  
The bipod mast is lowered over the stern with the lower ends of the mast legs pivoted to the side bundles of reeds  
By courtesy of Mr H. C. Gilson and Mr T. G. Tutin



PLATE IV



A TWO-MASTED JAVANESE SHIP OF THE 9TH CENTURY A.D., FROM A PANEL SCULPTURE AT BORO BUDUR

*Ph. Dr T. van Erp*

## THE SAILING SHIP IN ANCIENT EGYPT

planks after being sawn are adzed to shape, great care being taken to obtain tight joints ; the correct curve along the lower edge of each is obtained by the use of a primitive but efficient form of wooden compasses (*sheba*) ; this has one of the legs much longer than the other. The plank to be adjusted is now held close to and roughly parallel with the outer edge of the one last nailed on ; along this the long leg of the *sheba* is run while the short leg, wet with blue water-paint, runs along the inner surface of the plank next to be added, thus marking out the correct curvature which is then shaped out with the adze. As each plank is fitted in position, long iron nails are driven at an oblique angle through the seam from the upper plank into the lower. These nails or spikes are generally driven in alternately from the inner and the outer surface of the planking, the heads recessed as in text-figure I, B. As the planks are never long enough to form an entire strake, several short lengths have to be used. The ends of these at each joint are normally halved into one another and secured by a couple of nails, clenched on the outside. Sometimes a plain butted joint is seen but this is not characteristic of good workmanship.

When the last strake has been fitted, numerous cross-beams are added, their ends passed through recesses cut in the upper edge of the top strake and visible on the exterior. Thereafter the sides are finished off by nailing on a flat gunwale board and the provision of deckings and bollards as required. Finally the seams are caulked with rags from the inner side. None of these boats is ever tarred or painted. The mast is vertical and stepped amidships ; in a few rare exceptions, a second mast is present.

If we substitute broad wooden dowels for iron nails, we have in the hulls of these Sudanese craft a constructional design and technique recognizably similar in essentials to those characteristic of the Dahshūr boats (FIG. I, A) ; these latter, which are 33 feet in length, are also about the same size as the smaller of the cargo boats trafficking to-day south of the fifth cataract. In both a cross-section amidships approximates closely to an arc of a circle, with the planks in short lengths arranged brick-fashion, with all the joints broken, exactly as Herodotus describes : in both, too, ribs and floor-timbers are wanting, their absence in part compensated by the presence of numerous cross-beams at deck-level. It is therefore reasonable to conclude that the modern sailing craft that ply on the Upper Nile from the Dongola reach southward as far as sailing craft are able to penetrate, are comparable in all structural essentials with the river craft of dynastic Egypt as exemplified by the Dahshūr boats.

Jarett Bell (I, 101-111)\* has demonstrated that the sectional transverse curves of the Dahshūr boats are exactly such as are best suited to impart the maximum of stability to the hull when afloat ; as he points out, the pressure of the water acts on such a curve precisely as does a load upon an arch of similar curvature. He goes further, however, and states that in hulls of this form, the load should be carried on deck and not in the 'hold', otherwise the weight within will cause the seams to open, with consequent leakage, more or less serious. Theoretically this is correct and on many occasions, particularly when the cargo is liable to damage from water, I have noted that this axiom is duly appreciated, the bulk of the weight being carried by the deck and deck beams. This, too, is seen in the case of many representations of dynastic boats that have survived ; it is a noticeable feature, for example, even in the loading of Hatshepsut's fleet at Punt, though these ships probably had some primitive type of transverse framing.

Modern craft, however, are so strongly built, the planking so thick and so securely joined together, that under the favourable conditions prevailing on the Upper Nile, a

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\*References to relevant literature will be found on pages 40-1.

considerable amount of heavy cargo, such as bricks, may be fairly safely stowed below, up to and even above the level of the cross beams. Leaks may be expected but as cargo when stowed low is usually of a nature not liable to water damage, this does not greatly matter so long as the leakage can be coped with by an occasional bout of bailing, and by temporary caulking with any rags available; on an emergency a strip torn from a boatman's shirt may be requisitioned.

To counter longitudinal weakness, while dependence is placed mainly upon the strength of the keel-plank, an extraordinary multiplication in the number of the shrouds and stays led from the masthead to the gunwales is an important accessory device. No distinction save position is apparent among them; as all are provided with purchases, I propose to call them all stays. The number is very variable, being correlated with the size of the vessel and the nature of the traffic in which she is engaged (PLATE II). They seldom number less than 6 on each side and in one instance I counted 11 on each side—5 forward of the mast, 5 abaft it, and one abreast of it, all made fast above to the mast head. In addition a halyard belayed abreast of the mast functions as an extra stay. All these serve the same purpose and, to some extent, take the place of the hogging truss so characteristic of the larger vessels of Ancient Egypt. Besides thus reinforcing the keel plank to prevent hogging, they assist the cross beams to prevent the spreading of the sides, just as a buttress prevents the spreading of a masonry arch. So far, consideration of the Dongola and Omdurman type of hull fully confirms the view that the Dahshūr boats may be taken as having been built upon the same lines as the ordinary cargo boats of small and medium size, plying on the Nile during dynastic times, before the advent of Greek models which probably displaced them in the Ptolemaic period.

Regarding the design of the sea-going ships of Ancient Egypt, I cannot think that they were of the same simple model as the river craft. At the same time it seems equally improbable that the design followed, provided a pre-formed timbered framework to which the skin planking was secured directly. A mutation of this kind would be too revolutionary—too great an advance to be made in a single step. This conclusion is the more probable in view of the fact that an intermediate stage in the evolution of framing is seen in many localities on the shores and in the islands of the Indo-Pacific Ocean, whereby in place of a pre-erected framing, a few ribs are inserted *after* the hull planking has been assembled and in place. Examples are seen in the *mtepe* of the Lamu Archipelago, East Africa (Hornell, 16, p. 62), the handsome, gondola-like *orembai* of the Moluccas (Hornell, 13, p. 420), the fine *mon* of the Solomon Islands (Hornell, l.c. p. 421), and the closely related small craft of Botel Tobago, an island off the south coast of Formosa (Hornell, 14).

Considerable variation in constructional detail occurs. Simplest is that seen in the *mtepe* of East Africa. Here the planks are sewn together by means of coir twine passed alternately vertically and diagonally through parallel rows of holes bored in the opposite margins of the planks where they meet to form a seam. Forked crook-frames adzed to shape are inserted during this operation in such a way that some of the seam lashings pass over the frame ribs, thereby binding them down securely (FIG. 1, c, p. 31).

In the *orembai*, on what eventually will be the inner side, a row of upstanding lugs or comb cleats, carefully spaced, are left down the centre line when each plank is adzed to size and shape. The shell of the boat is thereafter assembled, the successive strakes of planking knit together by dowel pegs (as in ancient Egypt), care being taken to ensure that the cleats are so arranged that they will fall into vertical rows crossing the interior from gunwale to gunwale. Before this is done all the cleats have had a hole drilled through at the centre. When the hull has thus been put together, u-shaped frames are



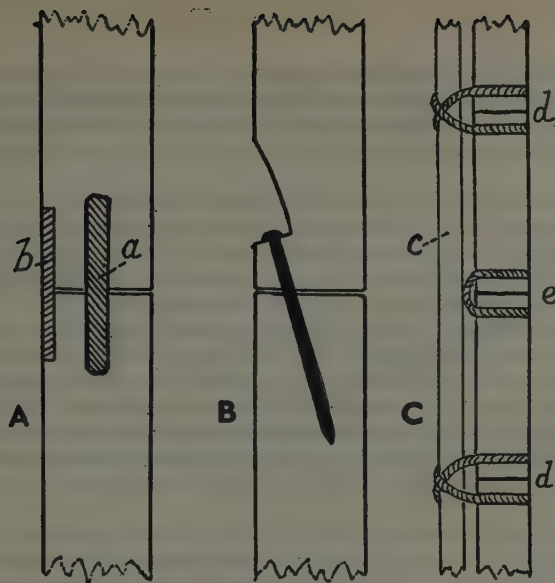


FIG. 1. DIAGRAMS OF THREE PRIMITIVE METHODS OF CONNECTING HULL PLANKING  
 A, in ancient Egypt as seen in the Dahshūr boats ; *a*, a broad dowel, and *b*, a dove-tail tenon, both in edge view ;  
 B, in Nubia and the Sudan, present day, by nails driven in obliquely, the heads being recessed ;  
 C, in the *Mtepe* of Lamu (East Africa), by means of sewing through holes in opposite edges (*d* and *e*). U-shaped cross-frames (*c*) subsequently inserted, are secured in place under some of the sewing lashings (*d*).

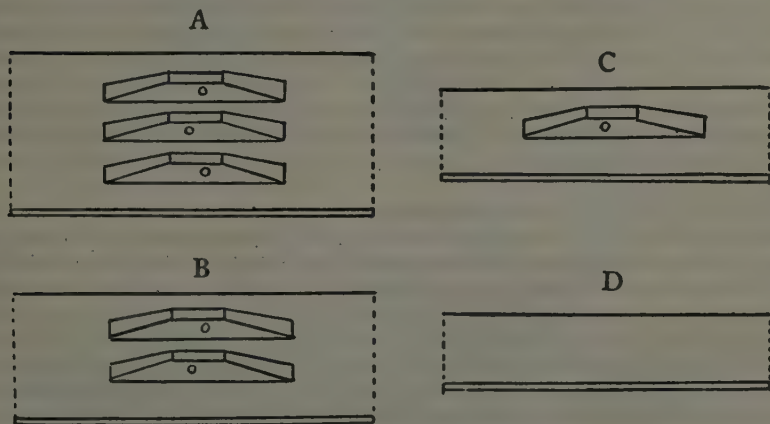


FIG. 2. INSERTED FRAMING

A diagrammatic series demonstrating the gradual reduction in number and the eventual suppression of rib-cleats in clinker-built boats :—

A, Als boat, circa 400 B.C. ; B, Nydam boat, c. A.D. 300 ; C, Viking ships, 8th and 9th centuries A.D. ; D, Present day.

fitted transversely at intervals and lashed down to the rows of cleats by rattan passed through the cleat perforations and over the limbs of the frames. It is worthy of note that the ends of the hull are similar in form, with the stem and stern-posts tall and vertical as in Winkler's 'square-ended foreign boats' from the sculptured rocks of the Eastern Desert.

In the Botel Tobago type a certain refinement is noticeable for the ribs are here perforated opposite each cleat in order that the lashings, instead of being passed over the ribs, are threaded through holes drilled fore-and-aft through them and then through the perforations in the cleats; several turns are made before the rattan lashing is made fast. Peg dowels are employed in addition, as in the *orembai*.

In the Solomon Islands' *mon*, the strakes are connected by concealed 'sewing'; to effect this the opposed edges are thinned down by bevelling on both sides and then, after sewing the reduced edges together, the grooves, outer and inner, are filled up with a resinous compound, hiding the method used to join the planks. When the hull is set up complete, U-shaped frames are inserted and lashed down to perforated cleats as in the *orembai*, but with the difference that the cleats rise from a prominent and continuous beading, median and longitudinal, on the inner side of each plank. No form of pegging is used.

In Northern Europe, even so far back as the transitional period connecting the Bronze and the Iron Age, a related technique characterized the clinker-built craft of the Vikings (FIG. 2, A, B, C, p. 31). The earliest remains show the use of very broad planks with perforated cleats arranged in vertical groups, varying from three to five according to the breadth, instead of in spaced singles as in those previously described. In later times the strakes became progressively narrower and with this change, single spacing of the cleats in longitudinal order was adopted, thus bringing the technique into line with that in use in the Far East. Another change was that cord or withy lashings ('sewing'), were replaced by iron rivets as soon as this metal came into common use (FIG. 2, D, p. 31). U-shaped frames were inserted and lashed down to the cleats after the Botel Tobago fashion, the upper ends connected and held in place by a horizontal cross bar serving also as a rowing thwart (FIG. 3). Boats of this design persisted down to the tenth century A.D. and probably even longer in isolated localities in Scandinavia. Even to-day clinker-built craft in England have the hulls planked up before the ribs are inserted but cleat fastening has disappeared, the ribs being riveted directly to the skin planking.

Which, if any, of these various methods was employed in Ancient Egypt we have no positive means of judging. It may well have been by inserted ribs tied to cleats, seeing that Egypt is situated geographically *between* the two localities where boat-building has been or is characterized by this peculiar technique. On the other hand the technique characteristic of the Lamu *mtepe*, has the great merit of simplicity. If it be objected that 'sewing' would be visible on the exterior of the hulls and would therefore be depicted by the Old Egyptian artists in their representations if it had existed, the answer is that rib reinforcement was necessary in Ancient Egypt only for sea-going craft and that in the oldest pictures of such craft—those of Sahure's fleet—indications of 'sewing' are clearly to be seen (Faulkner, 9, pls. II, III). We must also remember that even if sewing were practised, its presence might have been obscured or even concealed in one of several ways; of these the most likely would be that adopted by the builders of the *mtepe*. In this technique the sewing holes along the seams are plugged from within with wooden pegs upon completion of the work, the coir loops *outside* of the planking being then cut away, leaving no trace of sewing visible to the eye.

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The probability that this *mtepe* technique or some variation of it was employed in Egypt is increased when we find that a closely related method of joining pieces of wood together was actually in use in Egypt at a very early period. According to Lallemand

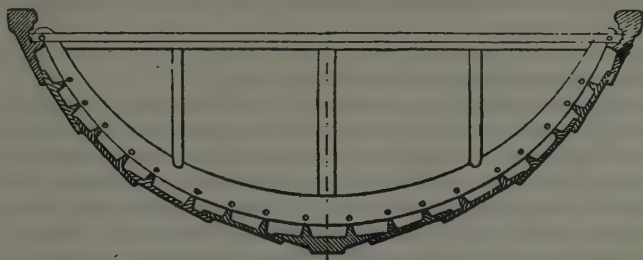


FIG. 3. TRANSVERSE SECTION THROUGH THE HULL OF THE NYDAM BOAT

The strakes are fairly broad, each with rib-cleats in sets of two. The holes indicate where the cleat lashings (not shown) pass through the semi-circular frame.

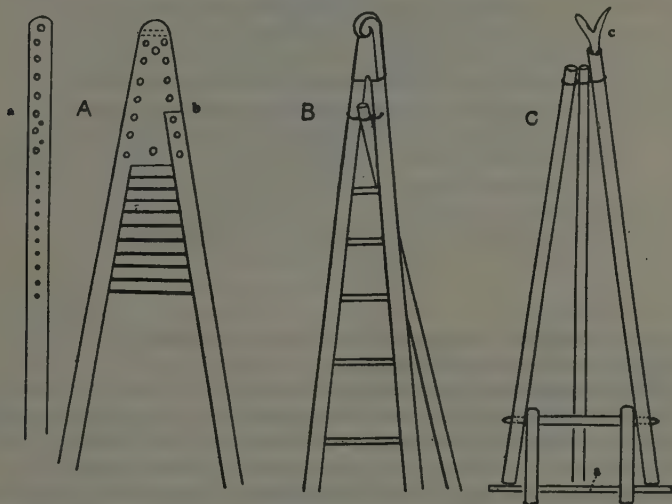


FIG. 4. BIPOD AND TRIPOD MASTS

A, Side view (a) and view from aft (b) of an Egyptian boat model of the Vith Dynasty (No. 4882, Cairo Mus.). Through the seven holes on each side of (b) seven backstays passed *obliquely* to emerge through the seven small holes on the edge of the mast leg, seen in (a). The lower 10 black spots on (a) are the ends of the 10 cross-bars connecting the long and the short leg of the mast. The upper two black spots on (a) are the ends of pegs securing the short leg to the longer; the upper end of the longer leg expands into a stout masthead cap.

B, The tripod mast of a large schooner-rigged Javanese coaster. Note the stout wooden cap connecting the upper ends of the two principal limbs of the mast. The third limb is a strut pivoted on a rope fitting below the masthead.

C, A simplified form of (B), as used on small craft in Eastern Indonesia. a, the deck; the tabernacle on which the two principal limbs are pivoted consists of two uprights and a connecting bar; c, a small crutch over which the halyard runs.

(19, 77-98, fig. 5), the carpenter bored two converging holes, meeting below, in one piece while in the other he pierced two divergent through holes as shown (FIG. 5, A, B, p. 34). Several turns of a thong were then passed through the four channels, tightened and



knotted securely. An improvement upon this was obtained by driving a plug of wood into each of the entrances to the holes in A. It is a fair assumption to infer that the outer surface was afterwards made smooth by cutting away what portions of the pegs and thong lashings projected above the general surface as was done when finishing off work on the hull of a *mitepe*.

Ligatures of flexible material other than leather were sometimes used—copper wires and bands and occasionally even lengths of gut.

It is, however, unnecessary to go outside of the Nile valley to find inserted framing in current use; it is typical of the vessels trading between Wadi Halfa and Shellal (Hornell, 15, p. 139), while in those built in the stretch between Aswan and Esna we see such an increase in the employment of these *inserted* ribs as constitutes a further advance toward the system of *pre-erecting* frames before planking up the hull, which is the exclusive custom of boat-builders on the Nile between Luxor and the Delta.

The first group is engaged in carrying cargo between the 1st and 2nd cataracts, a distance of 210 miles. Apart from the differences to be detailed later these craft have

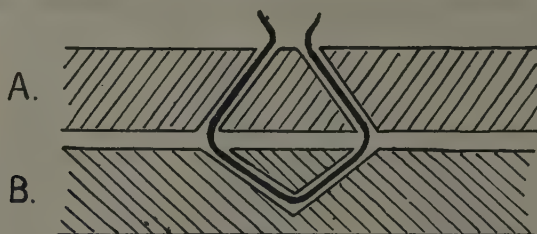


FIG. 5. ONE OF THE METHODS OF JOINING TOGETHER PIECES  
OF WOOD EMPLOYED BY CARPENTERS IN ANCIENT EGYPT AS  
EXPLAINED IN THE TEXT

*after Lallemant*

generally a greater moulded depth and the bilge a slight hardness not found in either of the types plying south of the 2nd cataract.

Craft of this description are all of moderate size. One which I measured at Wadi Halfa in 1937, regarded as a large one for this locality, is representative of its kind. The shell was 9.2 m. over all; the beam amidships, 4 m. and the depth 1.28 m. The cargo capacity was rated at 70 ardebs or approximately 10 tons of grain.

The constructional methods follow closely those of Omdurman. Sunt wood is used for all parts except the mast. The strake planking is in rather shorter lengths than is usual in Khartoum nuggars and is irregular in width as well as in length; sometimes a short piece of double ordinary width is intercalated in the run of the strakes; this and the irregular lengths of the planks, combined with the rough adzing of the unpainted surfaces, bespeak degraded workmanship and a lack of any artistic feeling. The strakes are nailed together as usual by iron spikes driven in obliquely. Many ends are butted together directly, with a caulking of rags between, but all important ones are halved together and secured by through nailing from the inner side, the projecting ends clenched down on the outer surface. The planking runs from 10 to 11½ inches in width and about 2 inches in thickness. Usually on each side of the keel-plank at mid-length are 9 strakes. Nine cross-beams hold the sides together; 4 give support to the fore-deck, 4 to the after one, and another, the main beam (*jagús*) a specially stout timber, 5½ inches

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thick, serves to support the mast which is lashed against it on the after-side. The ends of all these beams pass through the middle of the top strake and are not merely recessed into its upper edge as in the southern design, a difference due to the provision of deck planking in these northern craft; this change in technique is worthy of particular attention when considering the question of the presence or not of a deck in any particular boat in Old Egyptian representations.

One of the two most notable departures from the true Sudanese or nuggar design found farther south is the employment of inserted transverse frames (*hedera*). Of these there are usually 5, one placed across the bottom and sides under the fore-deck, 3 in the open waist and one under the after-deck. Each measures  $2\frac{1}{4}$  inches wide, with an average depth of 4 inches and is made up of a floor timber, overlapped at each end by an upcurving rib. In all three members holes are cut at intervals, fore-and-aft, in the lower edge to permit bilge water to drain through to the bailing place near the stern. *These frames are fitted after the shell planking is in place*; they are spiked from the inside to the strakes, the ends of the spikes clenched on the outside.

The stern has the square transom form seen in Sudanese nuggars, differing only in having the sternpost on the outside of the transom planking. The fore-end, however, differs from all Nile vessels plying south of Wadi Halfa; instead of the gunwale running from stem to stern without notable sheer, the fore-end in these northern craft curves upward in a strong and graceful sweep that begins just forward of the mast and rises fully 2 feet above midships height. The curve is gradual, without the abrupt, angular bend seen in the large Egyptian cargo boat (*gyassa*); similarly the curve from the fore-foot is well rounded and pleasant. The stemhead rises free nearly a foot; on the gunwale on each side a pair of bitts is fitted. The gunwale is finished off with a flat covering-board, 3 to  $3\frac{1}{2}$  inches wide and 2 inches thick.

At either end fore-and-aft planking is laid over the cross-beams to form true deckings, sunk 3 or 4 inches below the gunwale. The fore-deck slopes upward towards the stem and has a square hatch on the port side. The after-deck is horizontal, with a hatch a little way forward of the sternpost.

It is clear that here we have a boat design where two distinct cultural influences have met and blended. The basic constructional features of Ancient Egypt and of the present-day Sudan continue to prevail in respect of the way the hull planking is put together without the initial setting up of transverse frames upon stocks; even here innovation is evident, for the employment of inserted frames is an attempt to secure the advantages of a framed hull without serious departure from traditional custom. In all else, in the cock-up of the prow, the deck arrangement and the lateen rig, modern Egyptian and Arab influences have completely ousted the old cultural traits.

Further evolution towards an internal framework of modern type is seen in the craft built immediately north of Aswan, craft that ply northwards to Esna and occasionally to Luxor when cargo offers. Farther north they seldom venture.

The hulls are built as usual of thick sunt wood put together in Nubian or Sudanese fashion. Egyptian influence is seen in the bluff, full bows, the sharply upturned prow, almost vertical in the upper region, and in the lateen rig, usually two-masted. Strangely enough, although exposed intimately to the influence of the *gyassa* build, the design retains one ancient characteristic wanting equally in the current Sudanese and Egyptian types—the boat is double-ended, with the stern sharp and slightly raked. And while the *gyassa* type of light bowsprit is found in the Wadi Halfa-Shellal design, this is lacking in the Aswan-Esna type.

The hull after being planked up has a number of transverse frames inserted. In

one examined at Luxor, there were 4 in the open waist, 4 under the fore-deck and 3 under the after-deck ; in another the numbers were respectively 4, 3 and 2.

The fore-deck is level, not sloped upward to the stem as in the Wadi Halfa and gyassa types. Its length from the stem to the after-edge is about 12 feet. A median bollard may or may not be present. When it is, it is fitted immediately abaft the stem head. A pair of weak posts (bitts) is nailed against each bow. The open waist, 8 feet long, is divided into two parts by the stout main or mast beam. Along each side a plank connects the two decks, affording means of passing to and fro between them and a necessary fitting when the crew have to pole their craft in shallow water.

The sides of the after-deck are raised about a foot by means of a bulwark plank or weather board set on edge, supported by a stout knee on each side of the deck. In some boats, 8 feet abaft the fore-edge of this deck, is a low bulkhead, also a foot high, held together by a narrow capping bar. Two feet farther aft and about 18 inches forward of the sternpost, another cross bulkhead of the same height is placed. The narrow space abaft this is closed in on the sides by weather boards curving in to meet the sternpost ; it is boarded over and forms a small locker for oddments, to which a small covered hatch on the upper side gives access. The interval of 2 feet between the two bulkheads forms a narrow transverse space or cockpit. But in many boats this is not present, the deck running clear to the fore-side of the small locker.

North of this Aswan-Esna stretch all craft conform to the usual modern Egyptian boatbuilding practice ; a complete internal framework with closely set stout ribs and a powerful keel is first set up, the skin planking being subsequently nailed to the framing. With this type we have no concern as there is not the slightest evidence that this system was ever in use in Ancient Egypt before the advent of Greek shipbuilding design under the Ptolemies.

The conclusion that some form of internal frame strengthening was employed in the construction of the ships forming Sahure's sea-going fleet (5th Dynasty) and in all others onwards to those that sailed to Punt in Hatshepsut's flotilla, receives support from Jéquier's conclusion (17, 62) that in the Middle Kingdom there were two separate words [*msrt-w* and *wgāw*] to denote ribs, one for those on the starboard side and the other for those on the port side but that by the beginning of the New Empire one of these had disappeared, leaving only *wgāw* in use to denote the ribs on both sides. Boreux (3, 293), commenting on this suggests that it would be more correct to say that whereas in the Memphite Period a single word, probably *msrt* or *msprt*, was in use to denote a ship's rib or frame, during the Middle Kingdom, in the religious texts at least, the priests employed both *msprt* and *wgāw*, and that afterwards, beginning from the second Theban epoch, *wgāw* alone was the word for 'frame' in general use. In another passage (l.c. p. 296) he sees this belief in the use of ribs in ancient ship-building practice confirmed by the use of *wgāwy* in the 'Book of the Dead', chap. xcix: he argues that this word, read in conjunction with the context, must have had such meaning, for *wgāw* [or *wgāyru*] is there spoken of as being fittings in the interior of the hull and as being eight in number.

Boreux appears to be fully justified in the conclusion to which he comes. Budge (4, 300) is certainly wrong in his translation of the words at the end of line 22, cap. xcix as 'the Planks which are in its (23) hulk'. Erman and Grapow in their *Aegyptisches Handwörterbuch* render *wgāwt* by 'jawbone' (*kinbacken*) and this is most significant, for no better description of the form of a U-shaped ship's frame or pair of ribs could be given than by comparison with the shape of a jawbone. Further, the hieroglyphics rendered by Budge as 'hulk' are translated normally as 'belly', a word which reference



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to the context in this passage connotes most assuredly the 'hold' or interior of the boat; 'hulk' is meaningless as used here.

The cumulative effect of the evidence which I have tried to marshal above seems to me fairly conclusive as proving the validity of the generalizations which I shall now put forward, namely that:—

(1) The boat-building design and much of the technique of the Nilotic craft characteristic of the northern Sudan at the present day, have been inherited with little material modification from those of the river craft of Ancient Egypt as exemplified in the construction of the Dahshūr boats now in the Cairo Museum. The only considerable differences in detail consist in the substitution of nails for dowels and the abandonment of the use of dove-tail tenons. No ribs or transverse frames occur in either.

Many characteristics of Ancient Egyptian boatbuilding methods, superseded in Ptolemaic and later times, have survived in the south because there the later influences were slow to penetrate. In the Sudan ancient methods persist, largely unchanged, while in the intermediate region (mainly Lower Nubia) new features have made some progress, more, of course, in the north than in the south.

(2) The sea-going craft of Ancient Egypt were furnished with a limited number of transverse frames which, however, were *inserted* after the planking up was completed and not pre-erected after the modern Egyptian system; they thereby conformed to the practice now current in the hull construction of craft built on the Nile between Aswan and Esna, and, with slight modification, with those built between Wadi Halfa and Shellal.

In those large sea-going vessels of Ancient Egypt provided with a hogging-truss, it is likely that strong vertical struts were placed below the crossbeams which carried the crutches of the truss. Boreux goes still further; he refers to the fact that in some boat-models of the Middle Kingdom, the hulls are divided by a longitudinal partition or bulkhead which 'may be considered as the equivalent of a keelson, greatly heightened'.\* This was in his opinion a normal constructional feature in large vessels; in solid models, he believes that its presence is indicated by a longitudinal band or line, painted red, running fore-and-aft down the centre of the deck (3, p. 296; also Reisner, 22, figs. 14, 17, 20, 23, etc.)

### PART II—MAST AND SAIL

Representations of mast and sail in Ancient Egypt are exceedingly rare before dynastic times even if we include the masted craft presumably of prehistoric age depicted by Winkler (24) and Dunbar (8) from the Eastern Desert; these latter may, however, represent vessels belonging to intruder people who reached the Red Sea coast of Egypt from the south or the east.

When figures of masted craft of undoubtedly Egyptian build do at last appear, they show unmistakable signs of being the outcome of an evolutionary development extending over a very protracted antecedent period when vessels built of bundles of papyrus stalks were the predominant craft in use. The first definite representations occur early in the days of the Old Kingdom, when a mast of bipod form makes its appearance. From the 3rd Dynasty to the 6th this design represents the type of mast favoured by all designers of sailing craft irrespective of whether they were intended for traffic on the Nile or for voyaging by sea to other countries.

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\* Such I may note is a common Chinese practice in the building of junks.

The genesis of this bipod, sheer, or straddle mast cannot be traced in Egypt. There it bursts suddenly into view without apparent ancestry and already efficiently designed. Whether of indigenous origin or an introduction from a country where analogous physical conditions prevailed, cannot be determined definitely; from the fact that there is not the slightest evidence that the bipod mast has even been known to have been in use in Mesopotamia—the only neighbouring country where conditions were comparable with those of Ancient Egypt—the presumption may, however, be drawn that the bipod mast was a local invention of the Egyptians, designed to meet the peculiar and special needs of a marsh-living people using reed-built water transport.

For reed-built craft when used under sail the bipod mast is an invention born of necessity. A pole mast was probably tried in the beginning, only to be found unsuitable because its heel rested upon the weakest part of the frail structure, thereby entailing distortion and rupture of the bottom. That this is so, is obvious if we examine the structure of the only reed-built sailing craft of the present day—the reed *balsa* of Lake Titicaca in the highlands of Peru and Bolivia. Until recently the whole of the traffic and fishing on this lake was carried on by canoes built up of bundles of the tall *totora* sedge (*Scirpus tortora*). In these the floor consists of a single layer of huge bundles made up of totora stems bound round with ropes of plaited grass. Smaller bundles superimposed on each side convert the craft into a handsomely symmetric canoe when the two ends are drawn upwards to form a re-curved stem and stern as seen in many Egyptian representations (Gilson, 10, p. 536). The mast consists of two light straddled poles stepped near the bows. At the top they are lashed together and in the smaller canoes the ends are crossed below the apex in order to form a primitive crutch for the halyard; the lower ends spread outwards to be pivoted or hinged on lashings passed around the bundles forming the sides (PLATE III, B). By this arrangement strain is distributed over the parts best fitted to sustain it, for the floor soon becomes too sodden and rotten through constant immersion to sustain the weight and thrust of a pole mast if one were to be stepped upon it. Gilson (l.c. p. 536) states that these balsas last only for two or three months before they break up 'to be washed ashore and eaten by the cows'.

These Titicaca balsas vary greatly in size; the majority, used for fishing, are quite small but cargo balsas run to a size sufficient to transport either a dozen men or one or two horses and several men at one time; I have record of one which measured 20 feet in length and others are even larger, with width in proportion.

The sail is of reed matting, of exactly the same tall rectangular shape and rigged in the same manner as in nearly all Old Kingdom representations of the time of the 6th Dynasty, with a yard at the foot as well as at the head.

It is very strange that although there can be no doubt that the bipod mast either arose in, or was introduced into Egypt by reason of limitations imposed originally by the nature of the material (papyrus and various reeds) available most easily for the construction of the hull, almost all the representations of sailing craft that survive appear to indicate the possession of wooden hulls. This suggests that when art was sufficiently advanced to represent complicated boat subjects satisfactorily, wooden-hulled craft had come into existence and were employed under sail for all important traffic on the river and at sea, the use of reed canoes being restricted, except in exceptional instances, to the marshes and for minor work on the river.

Of the few exceptions where a reed hull of fair size is shown under sail, the best is one from Gebrâwi figured by N. de G. Davies (7, II, pl. XIX). In this numerous lines crossing the long axis of the hull indicate in the usual Egyptian conventional manner

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the circumferential lashings around the component reed-bundles. Another significant feature in this figure is the forking of each leg of the bipod mast, for this indicates the use of an ingenious modification of the basic device whereby the strain upon the sides is still further spread by an increased distribution of the fulcrum of leverage.

In nearly all representations in Ancient Egypt of wooden-hulled craft of bipod rig, a characteristic feature is the large number of backstays employed (FIG. 4, A). From this we infer that the mast units were insecurely stepped upon the deck. In modern times we see this fault remedied in two different ways. In the Burmese bipod-rigged rice-boats of the Irrawadi, a tabernacle fitting is installed, consisting of two upright deck posts to which the legs of the mast are keyed when set up; a somewhat similar tabernacle is in use in many islands of Indonesia, from the Celebes to New Guinea and the Sulu archipelago, but in these a pole strut set up forward of the bipod mast converts it into a tripod (FIG. 4, B, C), a modification which dispenses with the need to have any rope-stays apart from a single backstay (Hornell, 11, pp. 60 and 88).

Details of the masthead fittings are treated too superficially by the tomb artists to be of much use in a reconstruction intended to show how the standing and running rigging were arranged relative to the masthead accessories. Tomb models of boats supply this lack to a great extent. By the courtesy of the Director of the Cairo Museum I was permitted to handle and to make drawings of the best of their collection of bipod masts of the Old Kingdom period. Two of the finest came from Meir and date from the 5th Dynasty. In FIG. 4, A (no. 4882 in the Museum catalogue) seen from the after aspect, it will be noted that the mast consists of two unequal legs; the longer ends above in an expanded sub-conical block or cap, recessed at the right lower corner to receive the upper end of the shorter leg; this is secured in place by three pegs.

Further to reinforce the connexion, numerous closely set crossbars or rungs unite the two legs immediately below the mast-cap. In Museum number 4882 there are 10 of these upper rungs; in no. 4883 there are 9. As boats of the 3rd and 4th Dynasties are represented without rungs, as are also some of those of the 5th Dynasty, we may infer from what we see in the East Indies to-day that the absence of rungs indicates a smaller size than when rungs are present.

The distribution in time and space of the bipod mast and its modification, the tripod, may now be summarized briefly. So far as we know, no reliable mention, record or representation of a bipod sheer-mast occurs anywhere, apart from Ancient Egypt, until in or about the 9th century of our era the Buddhists of Java erected their vast stupa at Boro Budur (PLATE IV). Here, on the sculptured panels of the galleries that encompass the pile, are graven in relief the figures of four large two-masted ships and of one which is single-masted. All have sail set obliquely on the masts exactly of the shape and disposition seen in the present-day Upper Nubian (Dongolese) craft of the Nile (Hornell, 15, p. 131). This type was subsequently modified into the tripod type above referred to and this still flourishes throughout the eastern islands of Indonesia, having become obsolete in Sumatra and Borneo (Hornell, 11, p. 101).

Examples on the Asiatic mainland are the bipod-masted rice-boats of the Irrawadi and the larger river craft of certain south Chinese rivers in the Kwang-si and Kwangtung provinces. The only other instance in the Old World occurs among the primitive Koryak tribes living on the shores of the Sea of Okhotsk, who use a rude form of tripod mast made of three poles lashed together at the head by cord passed through drilled holes (Jochelson, 18, pp. 534-8). It is, however, possible that the peculiar masting of the sailing catamarans used in the flying-fish fishery on the Coromandel coast of south India represents a degenerate form of the bipod mast.



Crossing to the New World, bipod-masted reed canoes, as already mentioned, still ply their callings on Lake Titicaca. Craft with a related form of rig were also used at sea, for the historians of the Spanish Conquest record how the Conquistadores of Peru, upon their arrival on the coasts of Ecuador and northern Peru in the beginning of the 16th century, found the natives using large sailing rafts made of trunks of the light *balsa* timber, rigged with a square sail carried on a bipod mast stepped well forward, straddling the apparently clumsy craft from side to side (Hornell, 12, p. 352). These rafts are credited with having had sufficient seaworthiness and manoeuvring power to enable them to make lengthy coasting voyages; hence we may infer the possibility that in early dynastic times, when the bipod mast was the common type in use, the 'floats' of timber despatched from Phoenicia to Egypt may have made the voyage during the fine weather season under sail carried upon a bipod mast. The despatch vessels constructed of bundles of papyrus stalks (the 'bulrushes' of the Authorized Version of the Bible), mentioned by Isaiah (xviii, 1-2) as conveying messengers between Egypt and Palestine, may well have been craft of the Titicaca type, especially as the Egyptian reed-canoes were sometimes given a waterproofing coat of bitumen and/or pitch. Sailing vessels of this description would experience no difficulty in making coastwise voyages of the short duration indicated in Isaiah's statement, just as the sailing rafts of Punt occasionally made trading voyages to Koseir or other nearby ports during the period of Theban supremacy (Davies, 6, p. 46). Reed canoes under sail, under favourable conditions of wind and weather, would make ideal despatch vessels in an emergency when speed was the essential factor, for their lightness and extremely shallow draught would ensure a rapid passage if the wind were suitable; their great spread of sail carried on a lofty straddle mast and their light draft would ensure a good turn of speed.

The large size and great carrying capacity sometimes attained by reed-built craft is difficult to realize; the large loads transported by Titicaca balsas have already been mentioned; these, again, are exceeded by craft of related construction used on Lake Tana in Abyssinia, which may measure 35 feet in length and be capable of loading 7000 lb. of coffee berries (Clowes, 5, p. 17). So far as I know these last are never propelled by sail.

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# The Classics in War-time\*

by JOCELYN M. C. TOYNBEE

FROM 29 August to 5 September 1942, some four hundred and fifty persons, members of the Hellenic and Roman Societies and of the Classical Association and their friends, met in conference in Oxford to hear lectures, papers and discussions and to study special exhibitions of classical MSS, rare printed books and photographs and the cream of the Evans bequest of ancient coins. No one could doubt the motive which had brought them there, as they flocked day after day to the Sheldonian Theatre, the Divinity School, Christ Church Chapter House and other University lecture-halls to partake hungrily of the choice and varied fare spread before them. This was no mere gathering of professionals, but a congress of cultivated men and women of many walks in life and of all ages, bound together by devotion to our common heritage and all enjoying something of the very best from scholars of British and other nationalities, each a specialist in his own part of that all-embracing field of humane letters, art and thought which is the Classics. The dynamic, as opposed to static, character of classical studies was stamped upon all the lectures. Among the most arresting of these were *Aeschylus: New Texts and Old Problems*, by Professor E. D. M. Fraenkel, who read and interpreted new fragments, from the forthcoming volume of the Oxyrhynchus Papyri, assigned to the Δικτυουλλοί of Aeschylus—a charming addition to our collection of nursery-scenes from ancient literature and art; *Potter and Painter in Ancient Athens*, by Professor J. D. Beazley, who discussed, with lantern-illustrations, the various sources from which our knowledge of potters and painters is derived and pleaded for a study of potters in the future comparable with that devoted to vase-painters in the past; *The Study of Ancient History: an Apology*, by Professor H. M. Last, who defended the study of ancient history in general as being an unrivalled means of teaching the young how men think, act and react to circumstances, and the study of Rome in particular as a lesson in solving the most pressing problem of our own day, the combination of Freedom with Peace; *Pietas et Victoria, or the Emperor and the Citizen*, by the Rev. M. P. Charlesworth, who described the various ways by which the Emperor was made to appear to his subjects as *auctor pietatis* and victorious leader, with special stress on the aspect of imperial 'worthiness'; *The Decline of the Roman Empire in Western Europe*, by Professor N. H. Baynes, who, dismissing the many and various theories proposed in explanation of this phenomenon—soil-exhaustion (Simkhovitch), change in rainfall (Elsworth Huntington), the weakening influence of Christianity (Otto Seeck), the orientalization of the race in Italy and the West (T. Frank), cross-breeding and mongrelization (Nilsson), and class-warfare (Rostovtseff)—discovered its cause in the breakdown of intercommunications in the West and the decline of Italy as a source of revenue and reservoir of man-power, needs which in the East Asia Minor supplied, thus enabling the Eastern Empire to hold

\* ANTIQUITY is much indebted to Miss Toynbee for her report of this most inspiring meeting, which gave undoubted evidence that in the midst of the greatest War of all time the CLASSICS hold their own, and when the world is released from its present trials there will be an eager desire to resume the studies promoted by the Societies concerned.



## THE CLASSICS IN WAR-TIME

out for another thousand years ; and *Recent Discoveries from the Air and in the Field and their Bearing on the History of Roman Britain*, by Mr I. A. Richmond, whose lecture, illustrated by lantern-slides, stressed the enormous extension of our knowledge of Roman Britain, particularly in Scotland, in recent years through air-photography and field-work. The opening paper of the Conference, *The Third-Century Transition in Thought and Art*, by Father Gervase Mathew, O.P., struck a happy note in its insistence upon the interpenetration of counterbalancing tendencies, the interweaving of diverse strands, in a single period or a single individual. The attempt often made, when dealing with the Roman Empire in particular, to draw sharp contrasts between Greek and Roman, or between East and West, can be very misleading. In reality it is a case of varied emphasis, of the same ingredients all the time, but variously mixed by different people in different proportions in different contexts. The whole programme—ranging from Ionian Philosophy at the one end to Byzantine Church Music at the other—did indeed emphasize the essential unity of the Greek and Roman world, however various be the doors by which we may enter in. For many people in this country the most accessible and logical way of approach may well be, in the first instance, through the visible and tangible relics of that period of our history when Rome was the centre of our civilized world—Imperial Rome, through whom we have become the heirs of all the classical ages. Roman Britain will lead us, in the end, inevitably to the Greece of Aeschylus.

Students of Roman Britain should never forget that they are first and foremost classical students, that their chosen subject is part of our whole European and cultural heritage, and that a sense of proportion and humane balance are as vital in the interpretation of archaeological discoveries as in the political and social field. They have at the present time an unrivalled opportunity of promoting the cause of the Classics. One of the most striking and exhilarating events of the Conference was the discussion, opened by Mr C. E. Stevens, on *Future Work in Romano-British Exploration*. The War, said Mr Stevens, had provided unequalled chances for the student of Roman Britain ; and the possibilities for future research, for the keen amateur, no less than for the professional archaeologist, were almost unlimited. He stressed in particular the need for a new study of the Roman road-system, for the reconstruction of a more adequate picture of the social and economic life of the province, for a more intensive study of Romano-British problems from the Native side, for a new investigation of the ' villa- system ', for the establishment of a special ' ceramic commission ' and for the provision of a British *Esperandieu*. He prophesied the rise of state-patronage of Romano-British archaeology and pleaded for a solution of the financial problem which would enable a sufficient number of young and eager students to embrace Romano-British studies as a career. After this rousing lead-off, one speaker after another rose to insist upon the opportunities which the fortunes of War, popular reaction to the War and schemes already mooted for post-war reconstruction have put into our hands—opportunities which must be snatched without loss of time. Mr I. A. Richmond spoke of the need for securing a collection of the air-photographs taken over this country by members of the R.A.F. while in training, in which much invaluable archaeological material must be contained. Sir Cyril Fox stressed the fact that demolition work and rebuilding on ' blitzed ' areas will leave the Romano-British archaeologist no choice of sites in the immediate future : salvage will absorb our energies and an army of observers, spread all over the country, must be constantly on the watch. Mr Philip Corder testified to the hundreds of keen and intelligently interested visitors who throng daily to the Romano-British collections in our museums—a symptom, surely of an appreciation of the roots of our civilization

and of an instinctive craving for the unchanging past in the people at large, in revulsion from that uprooting of life and obliteration of history which are among the worst effects of modern war. He appealed for the greater development of our museums as centres of local culture and education. The importance of the educational aspect was eloquently stated by Miss Kitson Clark. We must foster this wide-spread and most encouraging interest in archaeology and see to it that in future plans for 'continuation' classes, adult education, and 'popular' travel the study of Roman civilization, so spontaneously desired, is allowed full scope. If post-war education in this country is to be still further 'democratized'; if our schooling is to become more uniform, at any rate in the elementary stage; then it is on the elementary schools that the future of the Classics will ultimately depend. We must (so the present writer is convinced) get our children already interested in Greece and Rome, already aware of something of that for which they stand, before their secondary education begins. We must initiate them into the Classics through the visible remains of Graeco-Roman culture and history in their own localities. We must introduce them, through inscriptions and *graffiti*, to the Latin language, and thence to Latin literature; and we must make them realize, since the Roman Empire was bi-lingual, that with Latin is linked inextricably—Greek. Only then shall we be truly democratic when we have thrown our classical heritage open to all.

Among the many important lessons learnt at the Conference was the great need for co-ordination and collaboration between the various bodies—learned societies, educational and cultural institutions and Government departments—now, so that immediate action may be taken when peace returns. Two committees have actually been appointed, as an outcome of the Conference, to consider a plan for more effective co-operation between bodies concerned with Greek and Roman studies on the one hand and British archaeology on the other.

Refreshed and invigorated, and fortified by generous and inspiring messages from the Dominions and the United States, the members of the Conference pledged themselves to unremitting efforts in the classical cause, that Greek and Roman studies may regain and retain their rightful and natural place in English life. A resolution approved by the members and sent to the President of the Board of Education read as follows:— 'This joint meeting of some four hundred men and women interested in ancient literature and civilization, organized by the Societies for the Promotion of Hellenic and Roman Studies and supported by the Classical Association, desires to emphasize the ~~great~~ importance of providing in any plan for education after the War adequate facilities for these studies, upon which as the centre of the humanistic tradition European civilization has hitherto rested, and which, in the opinion of this meeting, cannot be neglected without grave consequences'. A triumphant confidence in the vital power of the Classics to restore to sanity a dehumanized and barbarized world was the dominant note of that memorable week.

A full report of the complete proceedings, together with summaries of all the papers read and of all the discussions held, will appear in the *Journals of Hellenic and Roman Studies*; to these readers of *ANTIQUITY*, wishing for further details, are referred. Exigencies of space have only permitted us to describe the most salient features of the Conference here, with special emphasis upon its archaeological side. Attention might, perhaps, be called to the other papers dealing with antiquarian, artistic and historical subjects, as likely to be of more particular interest in the present context (assuming that papers of literary, philological and philosophical content will be emphasized elsewhere). These were:—*The Order of the Letters in the Greek Alphabet* (Professor J. L. Myres), *The Greek Discovery of Perspective: its Influence on Renaissance and Modern Art* (Miss

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G. R. Levy), *The Crisis in the Roman State from Sallust to Tacitus* (Dr Arnaldo Momigliano), *The Pronunciation of Latin : Evidence from the Papyri* (Dr H. I. Bell), *The Greek and Roman Art of War* (Professor F. A. Adcock), *Roman Imperialism in Lusitania* (Mrs M. I. Henderson) and *Sidelights from Roman Medallions on the Study of Art and Antiquities in the Roman Empire* (Miss J. M. C. Toynbee). A brief mention should also be made of the social side of the Conference—the words of welcome spoken in the Divinity School by the President of the Conference, Professor Gilbert Murray, followed by an address from Dr Aghnides, the Greek Under-Secretary for Foreign Affairs, on *The Greek Spirit as a Civilizing Influence*, and the two tea-parties, one in the Hall of New College, by the kind invitation of the Sub-Warden and Fellows, the other in Wadham College, through the kindness of the Warden.

All who had the good fortune to attend the Conference experience a sense of very special gratitude to the University of Oxford, for its hospitality, to St. Hilda's College, for providing a quite super-'billet' and social-centre in the most congenial atmosphere, to the Presidents of the two Societies, Dr A. W. Pickard-Cambridge and Dr H. I. Bell, and to the two Secretaries, Miss G. R. Levy and Miss M. V. Taylor. As Professor Baynes reminded his audience, when thanking the Secretaries at the end of his lecture for the burden of work which they had shouldered with such willingness and success, it was in the fertile brain of Miss Taylor that the whole idea of holding a Conference originated. To the imaginative insight which sensed this appetite for the Humanities in these inhuman times many of us will feel indebted all our lives.

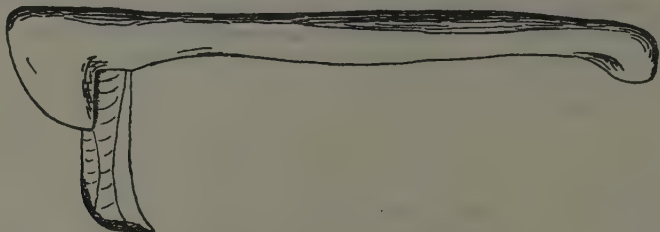


## Notes and News

### THE EFFICIENCY OF A FLINT SICKLE. By E. Cecil Curwen.

Not long before the war Axel Steensberg, of the National Museum, Copenhagen, wrote to me expressing some doubts as to whether the well-known flint sickle found complete with its original handle at Stenild in Jutland, and dated to the Bronze Age, had in fact been intended for use as a sickle. His doubts were based on some experiments he had been making with models of this and other types of flint sickles, and he told me that, whereas he found that the crescentic flint sickles functioned quite well as such, a model of the Stenild specimen tended to tear the corn up by the roots.

I have at last had an opportunity of testing this matter for myself, as a result of which it seems to me that Steenberg's experiment may have been vitiated by three things: (1) I understand that the flint component used was an ancient flake which was presumably more blunt than a freshly struck flake would have been; (2) he may not



MODEL OF STENILD FLINT SICKLE

have used the implement in the best way—pulling at the corn-stalks instead of slicing them across; (3) it seems fairly certain that the ancients cut off the ears of corn, grasping a bunch of them in the left hand and cutting them off with the sickle in the right hand; in this way there is no tendency to uproot the corn.<sup>1</sup>

The Stenild flint sickle is illustrated by a photograph published in *ANTIQUITY*, 1938, XII, pl. II, following p. 152. It consists simply of a sharp-edged, elongated flint flake, about  $4\frac{1}{2}$  inches long, set at right angles in a socket at the distal end of a handle some 14 inches long, the available cutting-edge of the flake being about 3 inches in length. My model of this implement (see figure) is somewhat smaller than the original, and consists of a flake of black Brandon flint (struck by the late Fred Snare of Brandon), with available cutting edge  $2\frac{3}{4}$  inches long, set in a handle nearly 12 inches long.

Happening last year to spend my holiday on a farm at harvest time, I obtained the farmer's ready permission to experiment on his wheat with my flint sickle, provided, of course, that nothing was done that would lead to any of the crop being wasted. This proviso naturally prevented me from cutting off the ears of the standing corn in the ancient manner, as this would have made it difficult to handle in the mass with the rest of the harvest. I had therefore to content myself with cutting the straws close to the

<sup>1</sup> For evidence of this practice in Britain see Diodorus Siculus, v, 21; for Egypt see Petrie, *The Wisdom of the Egyptians* (1940), 138-9.

ground—a procedure which, of course, entailed constant stooping, and therefore probably slower progress. I found that by grasping a handful of stalks in the left hand and slicing across them with the flint blade from left to right the implement worked extremely well and smoothly, a single stroke usually severing the whole bunch. If, however, I pulled the handle towards me instead of slicing from left to right, the tendency was to uproot the corn. Working in this way without haste, and taking time to lay the reaped corn tidily with a view to binding it into sheaves afterwards, I was able to cut 15 square yards in one hour, with three sheaves of corn to show for my labour.

Such a result would, of course, merely provoke unseemly mirth if considered from the point of view of the modern farmer and mechanized agriculture, but having regard to the primitive conditions known to have existed, say, in the Early Bronze Age, this result seems not unreasonable. In the first place, a person who was thoroughly accustomed to employing such an implement, and who could use it without wasting time in stooping—having only to toss the severed ears into a cloth or basket—would have covered the ground faster than I could. Also, when one considers the very limited amount of corn that was grown in those early days one realizes that 15 square yards would have been quite an appreciable slice out of the total area cultivated. At two early settlements on Dartmoor, for instance—Trowlesworthy and Standon Down<sup>2</sup>—the total ‘arable’ amounts to only some four to five acres, distributed in tiny plots averaging one-third to half an acre each, and associated with some 40 to 60 hut-circles. From this we may reasonably infer that each household cultivated on the average not more than one-third to half an acre, with one acre as the extreme limit. At the minimum rate, therefore, of 15 square yards per hour the average plot could be reaped in a maximum of 107 to 160 man-hours—not such a very heavy task if the whole household joined in.

## THE BOAT OF THE DEAD. By P/O L. V. Grinsell.

Since writing my article on the Boat of the Dead in the Bronze Age (ANTIQUITY, December 1941), my attention has been drawn to some remarkable boats and boat-shaped hollows in the vicinity of some of the Egyptian pyramids. These I managed to visit while on leave, and I can now supply the following details.

They are all situated near the pyramids on the desert fringe, on the west bank of the Nile between Abou Roash and Dahshūr. They are here described in order from north to south.

### 1. ABOU ROASH

Immediately east of the large pyramid, some 4 miles north of the Gizeh pyramids. A large boat-shaped hollow, in or near which statuettes of king Dedefre have been found, which are now in the Egyptian Museum at Cairo and in the Louvre. Axis N-S. 4th Dynasty.

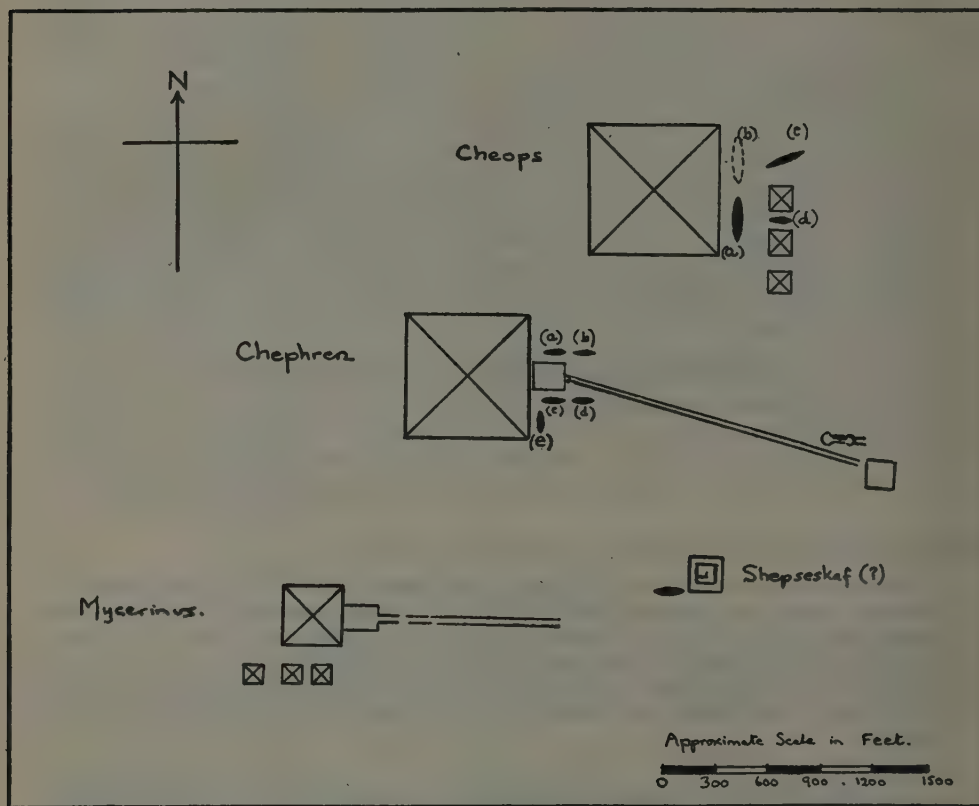
### 2. GIZEH, NEAR CHEOPS' PYRAMID

- A Near south end of east side, a very large boat-hollow surrounded by a modern stone wall. Axis N-S.
- B Near north end of east side, another boat-hollow of similar size is marked on the map opposite p. 43 of Porter and Moss, *Memphis Bibliography*. Of this there is no sign on the ground. Axis N-S, according to Porter and Moss.
- C Near northeast corner of pyramid, and north of the northernmost of the three small pyramids, a large boat-hollow. Axis WSW-ENE.

<sup>2</sup> ANTIQUITY, 1927, I, 282-4; *Proc. Preh. Soc.*, 1938, IV, 36-7.

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- D Between the two northernmost of the three small 'Queens' Pyramids,' east of Cheops' pyramid, a beautifully formed boat-hollow (see PLATE V). The transverse brick walls are comparatively modern and due to subsequent use of the hollow for storage purposes. Axis W-E.



ROCK-HEWN SACRED BARQUES, GIZEH

These four boat-hollows are most likely 4th Dynasty. Although at present unroofed, they were probably all originally roofed with limestone slabs which fitted transversely on to the ledges visible in the plate.

## 3. GIZEH, NEAR CHEPHREN'S PYRAMID

- A East of pyramid, north of causeway. A large example roofed with limestone slabs. Axis W-E.
- B East of pyramid, north of causeway, and immediately east of A. An unroofed example with undercut centre-castle. Axis W-E.
- C East of pyramid, south of causeway. A very fine and large example accessible by 22 steps. This boat-hollow is more elaborate than most of the others, and



PLATE V



ROCK-HEWN SACRED BARQUE, GIZEH (CHEOPS PYRAMID) No. 2 (d) (*see p. 48*)

*Ph.* P/O L. V. Grinsell

PLATE VI

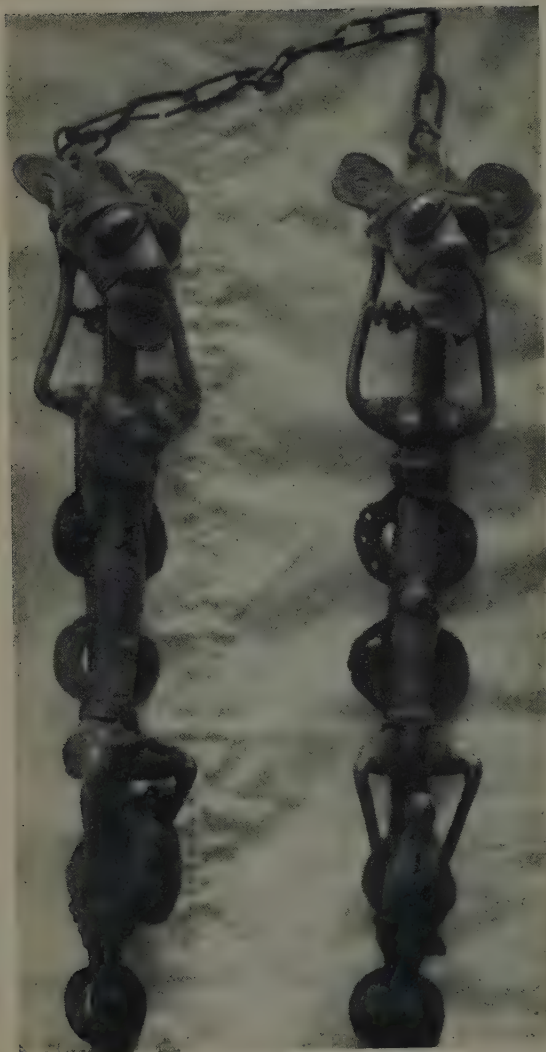


FIG. 1



FIG. 2

OGBONI STAVES FROM IFE, NIGERIA (*see* p. 50)

*Ph.* H. V. Meyerowitz

has a very large undercut centre-castle and a series of transverse stone ribs. The whole is roofed with limestone slabs. Axis w-e.

- D East of pyramid, south of causeway, and immediately east of c. A boat-hollow similar in size and style to c, but not so well preserved. Large undercut centre-castle and high prow and keel. The limestone roof-slabs have been removed exposing the grooves into which their ends fitted. Axis w-e.
- E East of pyramid, south of causeway. A roughly hewn boat-hollow with large undercut centre-castle. Limestone roofing slabs removed, exposing grooves into which they fitted. Axis n-s.

These five examples are most likely of 4th Dynasty.

## 4. GĪZEĤ, NEAR SUPPOSED UNFINISHED PYRAMID (OF SHEPSESĀF ?)\*

A very large and deep example, near southwest corner of the pyramid. Only about 2 feet wide on top but about 3 paces wide in undercut centre-castle. Roofing-slabs removed. Axis w-e. Probably 4th Dynasty.

## 5. ABOU GIRAB, SOUTH OF SUN-TEMPLE OF KING NEWOSERRE

A boat-shaped area enclosed in a wall of Nile mud brick. Arranged along the axis were a series of mud-brick pedestals on which it is thought that images of sacred hawks may have been placed. This boat-representation is now full of sand and only the top of the mud-brick walls can be seen. Axis w-e. 5th Dynasty. See BORCHARDT, *Das Re-Heiligtum des Königs Ne-Woser-Re*, vol. 1.

## 6. SAKĀRAĤ, NEAR PYRAMID OF OUNAS

About 200 paces due east of the pyramid of Ounas, and immediately south of the causeway of that pyramid, is a large boat-hollow faced with slabs of Tura limestone. Axis w-e. Probably 5th Dynasty.

## 7. DAHSHŪR, NEAR PYRAMID OF SENUSRET III

Near the western end of the south side of this brick-pyramid, M. de Morgan found three wooden barques and the remains of three others, each of the six being about 33 feet long. Two of them are in the Egyptian Museum at Cairo. The axis of each was w-e. Probably 12th Dynasty. There is now no sign of these boats, or where they were found, to be seen on the site.

It will be noticed that the examples from Abou Girab and Dahshūr are quite different from the others, all of which are rock-hewn. The rock-hewn examples tend to have a large and lofty centre-castle and a very high prow and keel, the latter feature being possessed also by many of the models of boats buried with the dead in later dynasties.

These great boat-excavations present many problems, as for example whether they contained wooden boats which have perished; whether they actually contained burials; and whether the later small wooden models of boats deposited with the dead represent a survival of the rock-hewn boat-forms discussed in this note. It would also be interesting to ascertain, by probing or making extensive clearances of sand from the east and south sides of other pyramids, whether one or more boat-hollows are normally accessory to each pyramid.

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\* Professor Alan H. Gardiner kindly informs us that the building here ascribed to Shepseskaf (?) is now known to belong to a queen Khentkawes; and that some much earlier boats were found by Mr Emery at Sakḥārah.



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There can be little doubt that they are connected with the funeral rites of those buried in the pyramids, and that some or all of them also represent the boats of the rising or setting sun or the sun-barques of the day (m'ndt) and of the night (m'skt) mentioned in the Pyramid Texts of the 5th and 6th Dynasties.

## LIST OF SACRED BOATS NEAR PYRAMIDS

No.	Locality	Approx. Dimensions			References
		Length (paces)	Beam (paces)	Depth (feet)	
1	Abou Roash .. ..	38	6	25-30	<i>Fondation Eugene Piot, Mon. et Memoires</i> , xxv, 1921-2, 53-75
2	Gizeh (Cheops) A	60	6	20	Porter & Moss, <i>Memphis Bibliography</i> , map opp. p. 43.
		?	?	?	
		45	4	20	
		22	4	12-15	
3	Gizeh (Chephren) A	27	3	20	
		25	4	20	
		30	4	20-25	
		28	3	20	
		30	4	20	
4	Gizeh (Shepseskaf ?)	32	3	25	
5	Abou Girab .. ..	30-35	10	15	Borchardt, <i>Das Re-Heiligtum</i> , vol. I
6	Sakkâra (Ounas) ..	50	6	20	S. Hassan, in <i>Annales du Serv. des Ant.</i> , xxxviii, 520
7	Dahshûr .. .. (Senusret III)	A 11	2	3	J. de Morgan, <i>Fouilles à Dahchour</i> , 1894, pp. 81 f.
		B 11	2	3	
		C 11	2	3	
		D 11	2	3	
		E 11	2	3	
		F 11	2	3	

## OGBONI STAVES FROM IFE, NIGERIA. By Eva L. R. Meyerowitz.

Staves of office, consisting of a pair of statuettes, the heads of which are connected by a chain and the lower extremities fitted with rods, were, and are still used in the Yoruba country by the Ogboni society in their ceremonials. The Ogboni society or league is a secret political institution ; its function was, and still is, to govern the town or township and to confirm the choice of all officials from the big chiefs down to the chiefs of the many guilds and religious societies.

Very little is known about its origin. Leo Frobenius<sup>1</sup> believes that the society in some form or other existed already amongst the Egba people, long before they were subjugated by the invading Yoruba in the 13th century, and that the Yoruba did their utmost to break its power. Unable to succeed they finally incorporated this institution into their own social system. Whether this is legend or not, the fact is that the Ogboni

<sup>1</sup> Leo Frobenius, *Die Atlantische Goetterlehre*, Eugen Diederich Verlag, Jena, p. 56.

society to this day is a fundamental institution in the Egba<sup>2</sup> districts and unimportant in the rest of the Yoruba country.

The staves (PLATE VI), come from the Ogboni house in Ife, which is said to be one of the oldest in the country. They were shown to me at my urgent request to see the most ancient staves. The Oni of Ife, a modern and enlightened ruler, was so kind as to give orders to his brother, head of the Ife Ogboni, to fetch some staves for me, while the court was dismissed as no Yoruba who is not a member of this society is allowed to see any of the sacred ceremonial objects.

The staves illustrated are of great interest, especially if one compares them with each other; the less important pair (right), is typically African in style and characteristically Yoruba at that, while the other is quite un-African in its conception, composition and style. There is nothing known to us, up till now, in the whole of the ancient art of Yoruba, including Ife, with which to compare it.

It seems to be a rule that the Ogboni staves are always made up of a male and a female figure chained together, and it is therefore surprising that the figures of the first pair (left) are bi-sexed, with female breasts, small sexual organs and male faces with beards. Altogether this pair of staves is very different from those few Ogboni staves so far known to us. The size also is above the normal and its construction is unusual, the actual staff being part of the body and neck, while normally the figure is a separate entity and fitted on to a staff or rod.

There is however the possibility that this pair of staves is not a common Eda-Ogboni as the Yoruba call them, but rather a pair of their Ewuana of which Leo Frobenius<sup>3</sup> says:—'Ewuana or simply Uana are figures cast in a yellow metal alloy of more or less stylized form. They are always a pair, male and female figure connected with each other by a chain from the top of their heads. These Ewuana are invariably regarded as representations of some parents, pairs of grand-parents or more further removed ancestors of blacksmith families descended from the god Ogun,<sup>4</sup> or finally, they are strangely enough regarded as symbols of the Ogboni society'.

It is strange that Frobenius did not come to the obvious conclusion, namely, that the Eda-Ogboni might be derived from the Ewuana. In his *Atlantische Goetterlehre* (page 60), he refers to the tradition that the power of the Ogboni was originally in the hands of the blacksmith clan.<sup>5</sup>

The staves are cast in a very light yellow metal alloy and undoubtedly are very old. Art in the Yoruba country, during the last two or three centuries, has been, on the whole, much too representational, within the limit of its typical African style, so much that an object so symbolic and well-nigh abstract would be completely foreign to its mentality and feeling.

The smaller staves, one representing a male and the other a female, as is generally the case with the Eda-Ogboni, are connected by a chain. The male figure is seated, holding a pair of clubs, dancing clubs or perhaps clubs used for divination. He is

<sup>2</sup> Now only a strip of country to the west and southwest of Ife with Abeokuta as its capital.

<sup>3</sup> op. cit. p. 146.      <sup>4</sup> God of Iron and of War.

<sup>5</sup> Sir Richmond Palmer, *The Bornu Sahara and Sudan* (1936), p. 148, speaking of the arts and crafts and particularly smith-work, is of the opinion that they were introduced into the Sudan by Kushite-Zaghava races, or parts of them. Among these Kushites a smith is a noble and fit for a king's daughter. The Kushites began to enter Africa by the Horn from 2000 B.C. onwards and gradually spread westwards. Between A.D. 100 and 1000 they were known to have occupied the whole territory between the Red Sea and the Atlantic. There is no reason to doubt that the Egbas were originally descendants of some of these Kushites.

wearing a loin-cloth down to his knees, a necklace and foot-bangles. The female figure is kneeling and presenting a box containing kola nuts, which are used when members of the Ogboni consult the great oracle, the Mummule. She is dressed with a hip-girdle and wears a necklace and foot-bangles. Both figures represent people in the dress of their times, when Mohammedan and European influence had not yet made itself felt. The three vertical lines on the woman's face denote that she is of the Egba tribe, the three oblique ones usually would give the town or district from which she came but now do not seem to be in use. Both figures are on a base decorated with small spirals; this pair of staves is cast in brass.

#### ANCIENT MINING. By E. M. P. Evans.

In his article on 'Ancient Mining Processes' (ANTIQUITY, September 1942) Mr Bromehead suggests that the archimedean screw was not known in medieval Europe as it is not mentioned in two mining books of the 16th century. In J. J. Wecker's *De Secretis* (Basle, 1604), the only old author I have here in the Bushveld, I find extracts from Cardan's *De Rerum Subtilitate*, describing this machine under the name *Cochlea Archimedis*, with an illustration. The construction shown differs from that which I have seen in Egypt, being made from a pipe bent spirally round an inclined axis. It was placed in a river and driven by the action of the current on vanes fixed to the axis.

It seems to have fallen out of use and been again invented. Cardan describes the sad fate of its re-discoverer :—

*Sed Geleaz de Rubeis civis noster faberque ferrarius, cujus infra mentionem facturi sumus, cum jam olim inventam ipse quasi primus auctor existimaret se reperisse, prae letitia insanivit. Vidimus eum versantem trusatilem machinam, ac paulo post mente excussum.*

Jerome Cardan's book was published in 1550. Presumably the re-invention had occurred not long before.

Under the name *Machina Augustana* another extract from Cardan describes and illustrates (somewhat incorrectly) an archimedean screw of seven stages, all driven by gearing from a vertical shaft. Being doubtful if it would work, he first made one of three stages. He notes that the water is delivered *subsultim*, in jerks. So it is not impossible for the Japanese to have learned of this machine from Europe.



## Reviews

THE ROMAN COMMONWEALTH. By R. W. MOORE, Head Master of Harrow School. *The English Universities Press Ltd., London, 1942. pp. 267 and 24 plates. 15s.*

When classical men begin to explain how important their studies are to the modern world, the cynic may sometimes think that they protest too much. But Rome, at least, is something that does beyond all question concern us, and we seem today to be recognizing this fact. How else account for the series of excellent studies that keep presenting to us different aspects and interpretations of the one great story?

Mr Moore's book is not just one of a set, conventional in subject and treatment. It shows individuality in choice of material, individuality in arrangement. The style is lively and calculated to keep the readers' attention keen. The object of the book, as expressed in the preface, is 'to give an account of Roman culture and Roman life as it was in its prime', and it is an object very fairly carried out in practice. Perhaps the spiritual side of things is rather neglected for the material; only one chapter—vii, The Gods—is mainly concerned with thought and belief. But this is rather an observation than a criticism. There is material enough available to fill many books on Rome, and Mr Moore has a full right to his own choice.

The book as a whole seems to fulfil its purpose extremely well. In it you can learn a great deal about the Roman home and private life, Roman professions, Roman games and entertainments, and you will find yourself accompanied and instructed by a guide who obviously knows and loves his subject. A chapter on science and knowledge collects many stray facts of interest, not so easily to be found elsewhere, and a chapter on Greater Rome gives a vivid and colourful picture of the Roman Empire. A number of quotations from favourite classics, translated for the benefit of the layman, enlivens the story from point to point. The illustrations are of excellent quality, in many cases, of great interest and beauty. Here and there one wonders why a particular scene has been chosen and placed where it is, but some allowance should certainly be made for difficulties of the moment. On plates v and vi the scale of the coins illustrated should be stated.

Lest this review should seem to verge towards mere 'assentatio', let me note that there are many things to arouse both thought and criticism, and let me give one or two examples. In the chapter on 'The Roman', Mr Moore finds that the Roman lacked 'humanitas' and that the Italian brought in a brightness and enthusiasm that the Roman had not. It seems to me that the best Romans were specifically 'human', and that the contrast between Romans and Italians for the Roman prime, Augustus to early Empire, is a false one. Nor do I believe that the 'molle ac facetum', given to Virgil by Horace, means 'tenderness and fire'—a view adopted by Mr Moore from Dr Garrod. The chapter on 'the Gods' is interesting and is surely right in recognizing the deep importance of religion in Roman life. But Mr Moore seems to suppose, as so many writers do, that an educated Roman must feel about the Gods as an educated man does today, which, with all respect be it said, is absurd. On p. 150 we read 'Emperor-worship was only a perfunctory expression of loyalty, in essence little more than saluting the Union Jack'. 'Expression of loyalty' perhaps, but not quite confined to that: 'perfunctory'—certainly not. As for saluting the flag, is not that under some conditions an act of

deep emotional and even religious character? In the book list, Mr Robert Graves's two admirable books on Claudius justly find a word of praise. But if it is Mr Graves's 'research' that led him to unearth the crimes of Livia, one could hardly have too little of it.

Mr Moore has given us a book that should delight many readers and leave them with a more complete picture of Rome than they had at starting.

HAROLD MATTINGLY.

ANNAIS. Volume IV, Academia Portuguesa da História, *Publicações comemorativas do duplo Centenário da Fundação e Restauração de Portugal*. Lisbon, 1941. pp. 140 and 52 plates.

Prehistory's contribution to the publications commemorating the bicentenary of the foundation and restoration of Portugal takes the form of two monographs by the Academicians E. Jalhay and Afonso do Paço. The first, entitled 'The Palaeolithic and Mesolithic of Portugal' is an exhaustive gazetteer of sites with brief descriptions, complete bibliography, and distribution maps, but no illustrations of objects. The sites are discussed in three chapters headed respectively Palaeolithic, Mesolithic and Asturian, and in each arranged by provinces. Under the first heading no less than 173 sites are enumerated, but many are frankly doubtful and in no case are the palaeoliths quite unambiguously fixed in datable geological horizons or associated with faunal remains. Most of the types mentioned are said to be Lower or Middle Palaeolithic. But at Campolide, where instruments of an Acheulian, Mousterian or even Upper Palaeolithic appearance have been reported there were certainly flint-mines, naturally neolithic or chalcolithic in age, and we know too well how easily flint-mine debris assumes a palaeolithic aspect! Again much of the material collected by Vasconcelos Cabral round Oporto, and here listed under sites 46-47, has been classified as Asturian by the late Serpa Pinto, and the authors seem to accept his verdict.

The mesolithic chapter is devoted exclusively to the famous 'shell mounds', generally lumped together under the label 'Muge'. Actually of 13 sites mentioned only 5 are in the valley of the Muge stream, while two (recent discoveries) are not in the Tagus basin at all but on the Sado. The authors confirm by reference to recent excavations, not yet fully published, the absence of *burins* from the classical Muge sites, and mention the presence of 'rubbers' (possibly grain-rubbers) from Cabeço da Amoreira, and bones of sheep and cattle from Fonte do Padre Pedro. Moreover, it is remarkable that though half a dozen Asturian sites are now known in the Muge Valley, no Asturian artifacts have been found in the shell-mounds. The chapter on the Asturian itself enlarges the authors' previous work and brings the total of sites known in 1939 up to 41. The useful monograph is completed by a bibliography of 241 entries.

The second monograph, 'Grotto II in the Necropolis of Alapraia', is of even more immediate interest to English readers; for the architecture and furniture of this rock-cut tomb near Estoril on the Tagus estuary substantially advance our knowledge of the Megalithic and Beaker cultures in general, and of the relations between Portugal and the British Isles in particular. As at Palmella, the chamber was of the tholos form, 4.75 metres in diameter and 2.45 metres high, preceded by a passage that had unfortunately been largely destroyed by road building. As at Palmella and in other Portuguese chamber-tombs, there was an aperture in the roof 1.25 metres wide. After a judicious discussion of the comparative evidence the authors conclude that this hole must be accepted as an original feature and in fact that the later interments were introduced through it, and not through the door. Such was demonstrably the practice in the built



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chamber-tombs of Hagios Kosmas in Attica as in the Early Minoan tholos at Krazi in Crete. May it not explain the interments in some British tombs too where for instance the space between the portal stones is too narrow for an undertaker to creep through?

The skeletons, both in the chamber and the passage, were in poor condition and mostly in disorder, but certainly numbered several tens. One or more seemed to have been deposited in the embryonic posture in 'a sort of trench (*sulco*) less than a metre wide but of irregular form' in the chamber floor.

The grave-goods correspond to the Copper Age inventory classically represented at Palmella, but show significant novelties. Of the 20 flint arrow-heads, 15 are more or less rhomboid or leaf-shaped, 3 hollow-based, none mitreform or tanged-and-barbed, but there were in addition 6 microliths. The pottery comprised beakers and plain leathery Western vases. One of the latter has a loop-handle just above the keel, while in others the rims are indented with finger-tip imprints or squashed down like British Neolithic A2 ware. Most of the beakers are of the Palmella form, decorated in the 'Grand Style'. But with the skeleton in the 'trench' lay a Pan-European beaker of fine red ware decorated with alternating plain and rouletted zones, worthily illustrated on an excellent coloured plate. If the excavators' theory that late burials were introduced through the hole in the roof be correct, it should follow that this beaker accompanied the primary interments, so that—at least at Alapraia—the Pan-European type should be older than the Grand Style in contradiction to generally accepted notions. But unfortunately it is still arguable that the trench was cleared out to receive each fresh interment like the grave-pit in a Mycenaean chamber-tomb or the cist in the passage-grave of Unival described by Sir Lindsay Scott (*ANTIQUITY*, 1942, XVI, 301 ff.) Unless this possibility be excluded, the relationship between the two styles can be reversed.

As ritual objects must be classed two of the classical Portuguese plaque idols (both found lying horizontal on the tomb-floor), a dozen limestone cylinders (only one engraved) a pair of stone sandals and a stone lunula. The sandals were found in the 'trench' with the red beaker. Though clearly votives unsuited to everyday use, they are each 21 cm. long and would fit the feet of an adult of small stature. The nearest analogy is of course the larger bone sandal found by Siret in the tholos tomb of Almizaraque (Almería). But the authors very properly call to mind the ritual use of sandals attested on early Egyptian monuments, and mention the engravings of feet on rock-surfaces and megaliths in Ireland, France, Scandinavia and Africa. The lunula lay on the floor in the very centre of the chamber. It is a thin crescent-shaped plaque of limestone, 18 cm. long and unperforated. Six others are cited and illustrated from chamber-tombs and sepulchral caves between the Tagus and the Atlantic coasts. One from the newly discovered rock-cut tomb near Carenque is perforated for suspension, but at the centre of the convex edge so that it could hardly have been worn as a collar. A fragment from Pedro de Mouros, however, is perforated near the surviving end. It is moreover decorated with lines parallel to the edge, as is a fragment from Trigache. Both these present a real analogy to the Irish gold collars and their Scottish counterparts, the crescentic jet necklaces.

Finally among the ornaments, besides beads of callais, are two grooved cylindrical pin-heads of bone such as were so popular all over the Peninsula in the Copper Age, and have perhaps been found with a food-vessel in Galway. So this handsome volume is a substantial contribution not only to the archaeology of the Peninsula but to the prehistory of Atlantic Europe as a whole.

V. GORDON CHILDE.



## ANTIQUITY 1943

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THE leaflet issued with the December number of ANTIQUITY explained to our Subscribers the necessity for the change—due entirely to Paper Control—which has had to be made in the type used for articles. No one regrets it more than the Editors, who for 16 years have maintained the high standard in form they set at the beginning. With regard to the change, actually we have planned a number which contains about three-fourths of the matter which has been given since the War began. We regret also the limitation of plates.

Subscribers may rest assured that directly the opportunity is given the original 'make-up' of ANTIQUITY will be renewed.

As we said in the leaflet we rely on the good-will of our Subscribers, who we are sure realize that these changes would not be made unless forced upon us. We hope that ANTIQUITY will be supported as in the past and take its share in the Battle for Culture, for by continued publication we feel confident that when Peace comes it will be possible to return to our full activity.

With the leaflet was a form for the subscription for 1943. Many have used it (and in doing so have expressed their pleasure that ANTIQUITY will still be published) and to them our thanks are now given. We hope that those who have not yet responded will do so as soon as may be convenient, and thus enable the Editors to go forward with confidence.

*Subscriptions should be sent to Roland Austin,  
24 Parkend Road, Gloucester.*